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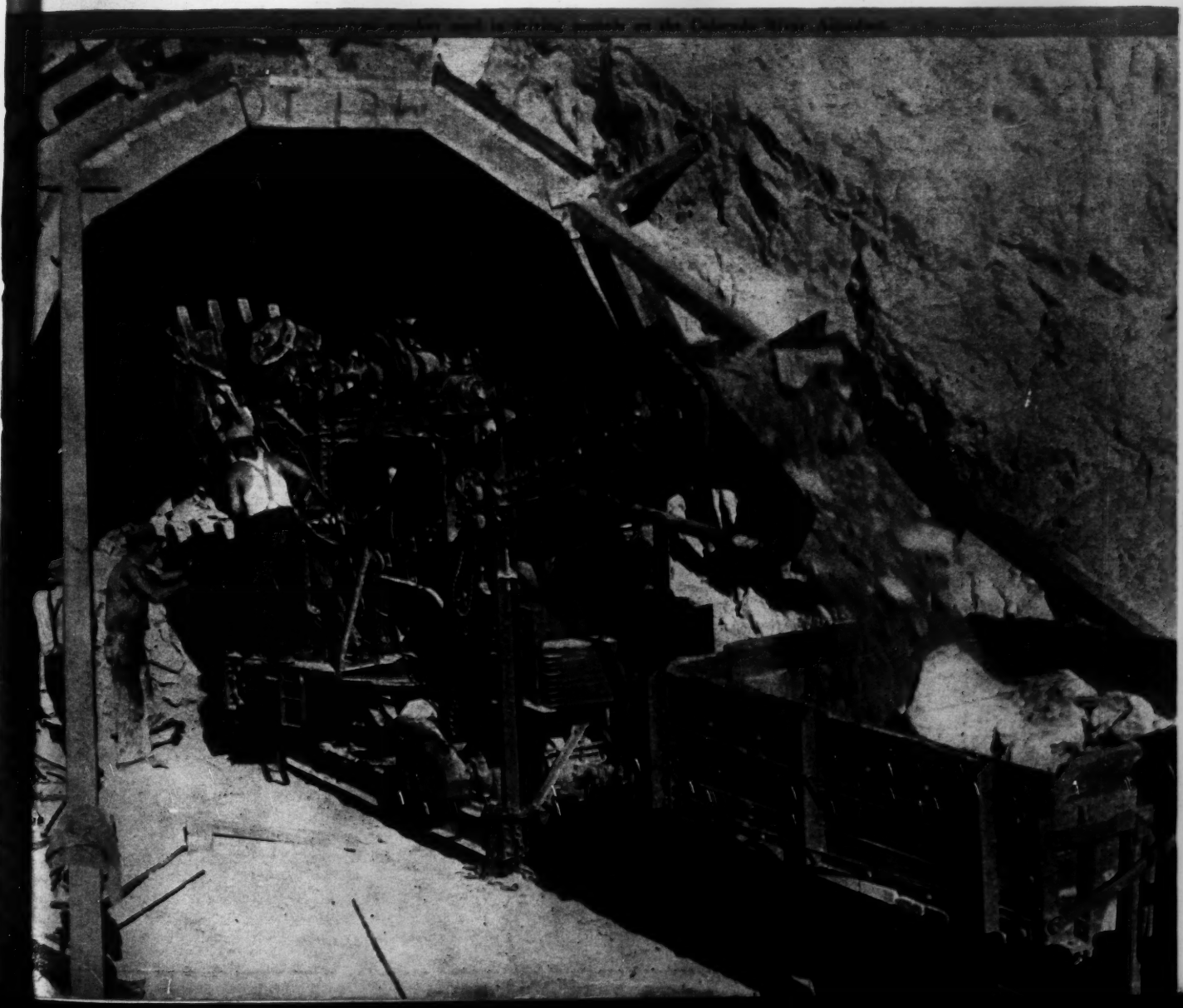
Engineering News-Record

July 26, 1934

Driving 91 Miles of Tunnels on the Colorado River Aqueduct . . . . Federal Program for Subsistence Homesteads . . . . Seawall for State Beach at Hampton, N. H. . . . . Checking Moment Computations for Rigid Frames . . . . Improved Highway Design for Side Hill Cuts . . . . Prevailing Rates of Pay for Civil Engineers



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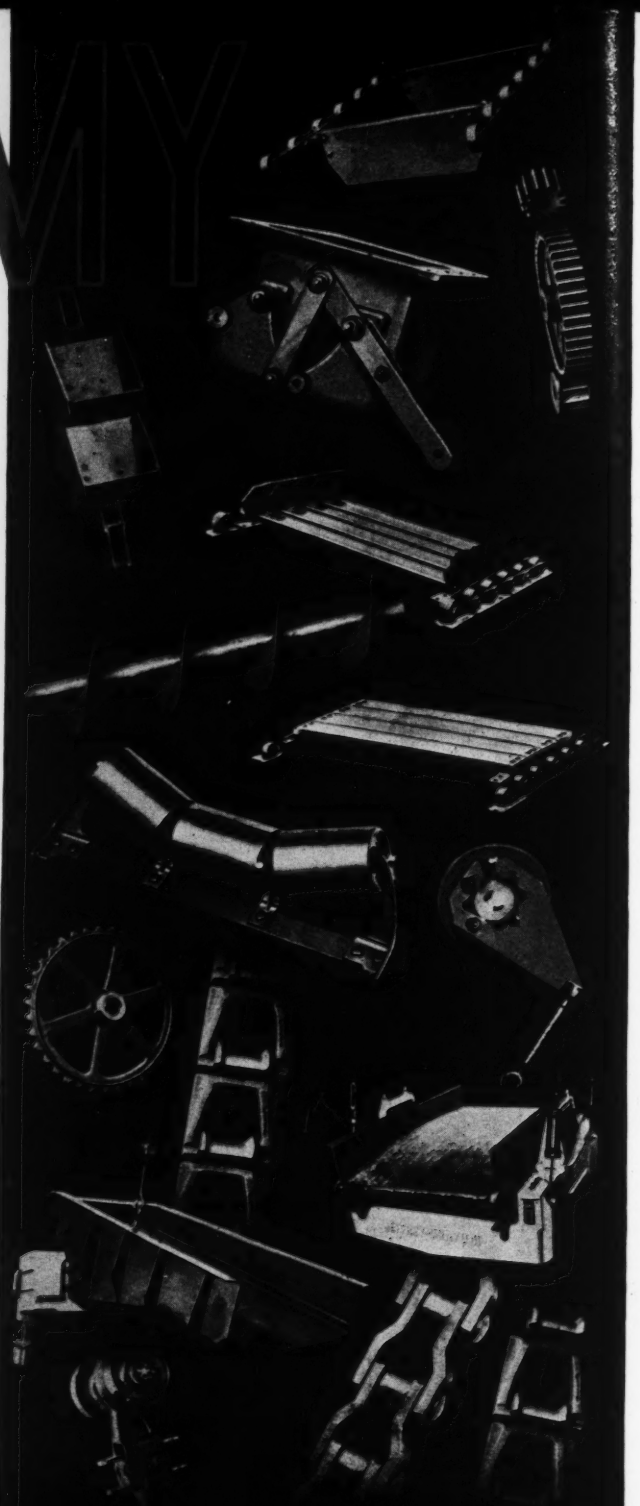

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To Stabilize Construction

WITH the resumption of a federal highway program that justifies hope of continuity in that important activity, with promise of more energetic prosecution of the public works program and with improvement in the municipal bond market, the construction industry now turns expectantly to the National Housing Act, recently signed by the President.

This embodies three major efforts, of which the most immediate is a drive for repair and modernization of existing homes on a plan that will encourage the participation of private capital and credit, a prime essential to continuous betterment of construction volume. It is estimated that of such work $1,500,000,000 may be in hand by autumn of next year.

Next is a scheme to stimulate new home building. Here is a shortage, accumulated during the last few years and destined to become an active demand just as soon as many "doubled" families reestablish homes of their own. It is estimated that this will require eventually some $5,000,000,000 of new home building.

But most significant and far-reaching is the basis on which the Housing Act plans to finance both these activities and the long-term effect this program is likely to have on the financing of existing and new homes.

It establishes a mutual insurance corporation to underwrite private building loans that conform to certain conditions, which are destined to mark a notable advance in the practice of home financing. These conditions are directed against second-mortgages with their attendant evils and those deceptive three and five-year term mortgages which no one expects to meet at maturity and which periodically put the borrower at the mercy of his creditor. They seek to spare the borrower the exactions, both in interest rates and arbitrary renewal fees, that have been nothing short of a racket, while at the same time they seek to establish such loans on a basis that will make them attractive and secure for conservative investors. In place of the present trouble-breeders, it aims to substitute insured loans that will run for long terms at reasonable rates and be amortized by periodical payments on the principal throughout the life of the loan.

The details of the program have been fully set forth elsewhere; here it is intended only to suggest the wider significance of the enterprise. This act recognizes that the basic evils of the construction industries must be sought in the methods by which construction is financed.

Over and over again we have been told that construction is the balance wheel of our economy. But it is common knowledge that the construction industry is either a prince or a pauper; either it is riding high, wide and handsome or it is prostrate in the gutter. Obviously such an industry is poorly qualified to perform the function of a balance wheel. Yet it must do just that, because it is the agency by which our accumulated capital and available credit is converted into current consuming power. And this power, thus exerted by those engaged in construction and its dependent industries, constitutes in fact that balance of power which determines the smooth operation of the complete economic machine. When construction is active we have a boom; when it is prostrate we have a depression. From that there is no escape.

Obviously, then, if construction is to stabilize the whole, it must itself be more stable. It must be made in fact a balance wheel rather than an eccentric, tending to throw the whole out of kilter. And the way to stabilize construction is through those financial processes that control the flow of construction activity.

The incurring of debt to build homes, railroads, utilities, industrial plants and other varieties of fixed wealth should provide invariably for amortization over reasonable periods; otherwise it but piles upon the economic machine a heavier and heavier eccentric load. The use of commercial credit to finance such improvements, the interminable refunding of such loans all contribute to the same end. The way to make construction truly a balance wheel is to insure that its operations be financed from past savings and from prudent long-term loans that carry from their first day an adequate provision for amortization within the life of the loan.

If these principles had been observed in the past, our railroads, utilities, industries and home-owners all would be better off today; beyond question the construction industry and all its dependents would be better off.

The new Housing Act applies a fundamental principle to one field of construction; that principle might well be observed in every variety of construction enterprise.

Willard Chevalier

NRA CODE

ENGINEERING NEWS-RECORD

Published every Thursday. Vol. 113, No. 4. Price 25c. per copy. Subscription, domestic, Mexico, Central and South American countries, $5 per year. Canada, including duty, $7.50. All other countries, $9 a year or 36 shillings. Entered as second-class matter April 11, 1917, at the Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A. Cable Address "McGrawhill, New York." Member A.B.P. Member A.B.C. Copyright 1934 by

McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42d STREET, NEW YORK, N. Y.

Editorial and Publishing Offices: 330 West 42d Street, New York; 520 North Michigan Avenue, Chicago; 883 Mission Street, San Francisco; Aldwych House, London, W. C. 2, England. Branch Offices: Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Greenville, S. C.

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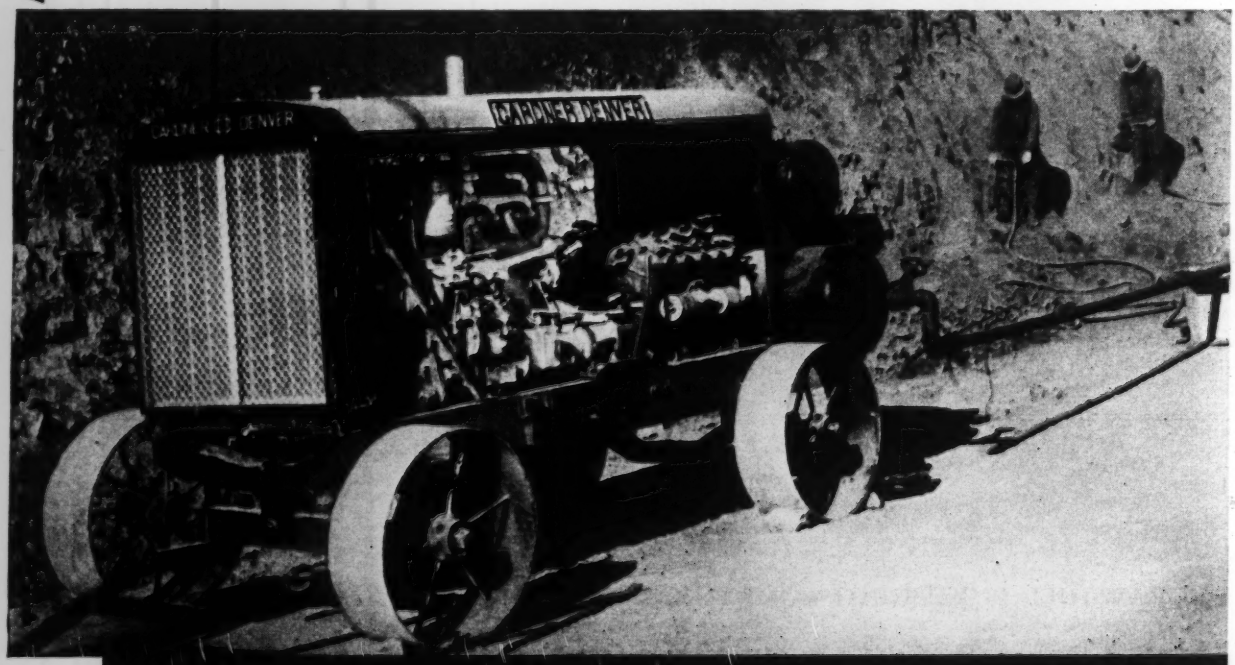

AMERICA GOES DIESEL

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Copyright 1934 by McGraw-Hill Publishing Company, Inc.
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In the News:

THE DROUGHT continues unabated in the Middle West, and acute water shortages harass farmers and encroach upon towns and cities. Panama suffered several damaging earthquakes and heavy rains. Floodwaters of the Vistula River in Poland are reported to have taken more than 200 lives and caused $200,000,000 in property damage.

A TEN-LANE HIGHWAY was opened last Saturday in the Borough of Queens, New York City. Known as the Cross-Bay Boulevard, it traverses Jamaica Bay to Rockaway Beach. The ten-lane width was obtained by adding lanes on each side of the former six-lane highway.

TALK HAS BEEN RENEWED in New York on the possibility of securing a federal loan to start work on the long-planned Sixth Avenue subway. It is understood that the city administration regards the new line as essential, regardless of the outcome of efforts to unify the lines operated by the city and private companies.

FIRST CONCRETE was deposited in Norris Dam of TVA last week. It went into the east abutment. The mixing plant is on the western bank, and transportation is by cableway.

THE STRUCTURAL STEEL fabricators' code committee has notified General Johnson that the changes that NRA inserted in its code, particularly the placing of erection work under the construction code, are unacceptable. The code was to have gone into effect on July 22.

PURCHASES of the Kentucky State Highway Commission are subject to the 3 per cent state sales tax, according to an official ruling. The annual tax payment involved is said to be about $100,000.

In This Issue:

TUNNEL DRIVING on a vaster scale than ever before attempted characterizes present work on the Colorado River Aqueduct of the Metropolitan Water District of Southern California. Thirteen contractors are driving 58 miles, and the District's forces are driving 33 more. All tunnel sections are the same, but methods and equipment vary widely in the 47 headings being worked. Full-face drilling, automatic drills and improved muck handling were typical factors in permitting 30 miles of the total to be completed in less than eighteen months. In the article in this issue the tabulations of progress and of equipment in use are particularly significant and noteworthy.

IN ANOTHER of the articles discussing contractual policies and practices in federal construction, Howard L. Jones points out that compliance with a code or with the terms of the President's reemployment agreement is necessary for anyone bidding for government business.

SO FAR, $10,000,000 has been allotted to about 40 federal subsistence homesteads in twenty states. The program, its accomplishments and future plans are outlined in an article in this issue.

NEW HAMPSHIRE does not have much ocean frontage, but it is actively undertaking the protection and development of the few miles that are in its domain. The state highway department has been given charge of the state beach development and at present is building a 3,800-ft. seawall at Hampton Beach.

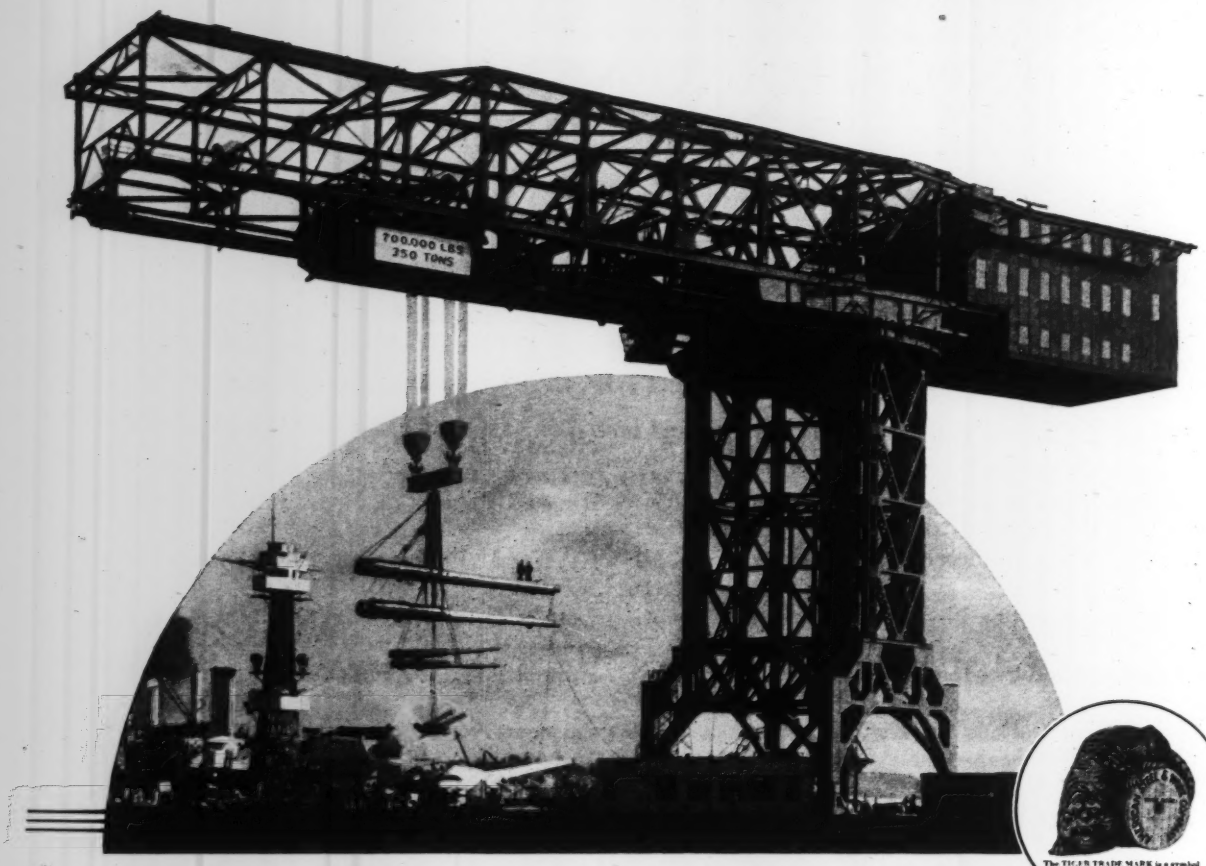
THE METHOD of distributing fixed-end moments in indeterminate structure design, originated by Prof. Hardy Cross, has enjoyed increasingly wide utility since it was introduced a few years ago. It is natural and proper that others should attempt to supplement it or improve upon it as occasion demands. In this issue is presented a simple analytical method for checking the accuracy of the computed moments.

A NEW HIGHWAY CROSS-SECTION has been developed by the National Park Service for use along side-hill cuts. It involves extending the surfacing to the toe of the cut. Economy, appearance and efficiency are claimed to be raised.

THE REVISED REPORT on prevailing salaries for civil engineers approved tentatively by the Board of Direction of the Am.Soc.C.E. at the Vancouver meeting is published in this issue.

Coming Articles:

NEXT WEEK the greater part of the issue will be devoted to four articles on San Francisco's Hetch Hetchy water supply, whose completion after two decades of construction will be celebrated early in September. A foreword is contributed by M. M. O'Shaughnessy, who, as city engineer, was responsible for the work from its inception. L. T. McAfee, chief engineer and general manager, writes on how the Hetch Hetchy system was planned and built. The history of San Francisco's struggle for a municipally-owned water system, its operation of the new aqueduct and a review of the water-rights problems are also outlined.



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ENGINEERING NEWS-RECORD

July 26, 1934

FIG. 1—ENGINEERS who surveyed the Colorado River Aqueduct across the desert.

Driving 91 Miles of Tunnels on the Colorado River Aqueduct

Methods and equipment as well as rock formation vary widely in 47 headings—Full-face drilling, automatic drills and improved muck handling are typical factors in progress

By R. M. Merriman

Superintendent, Coachella Division, Metropolitan Water District of Southern California

ON THE 241-mile aqueduct that is to bring water from the Colorado River to thirteen cities of the Los Angeles metropolitan area, tunnel driving, the controlling factor in the completion of this $220,000,000 project, is well under way. General features of the project were outlined in *ENR*, June 16, 1932, p. 847. In the year since actual construction started, preliminary work has been finished, and on June 1, 1934, a total force of some 5,000 men was at work for the district and contractors combined. Roads, water systems, telephone lines, camps and hospitals have been built, and on the tunnels themselves contracts have been let or district's crews put to work to the extent that adits and shafts have been completed and headings advanced at least far enough to indicate what conditions will be met. Tunnel-driving operations will be at a maximum this year, although final completion of the lined tunnels is not scheduled until 1938.

Scattered along the entire length of aqueduct, the 29 separate tunnels, totaling 91.72 miles in length, present a wide variety of conditions. In the hard blue granite under Mt. San Jacinto (whose peak is at El. 10,000) there may be extremely wet zones; almost 1,500 g.p.m. in one heading has already been encountered, and in the desert country the driest imaginable conditions are found, so that sprinkling to keep down the dust is a regular practice.

Some of the construction camps are fairly close to towns, and in other places truck hauls as long as 50 miles are required. Because of varying conditions methods of carrying on the work to best advantage also vary. The district desired to contract as much of the tunnel driving as it could consistently, and also to do enough of the work by force account to maintain a check on costs by the contract method and to have an organization that could take over any contracts in case of default.

At present there are thirteen contractors at work on a total of 58.06 miles of tunnel. A total of 33.66 miles

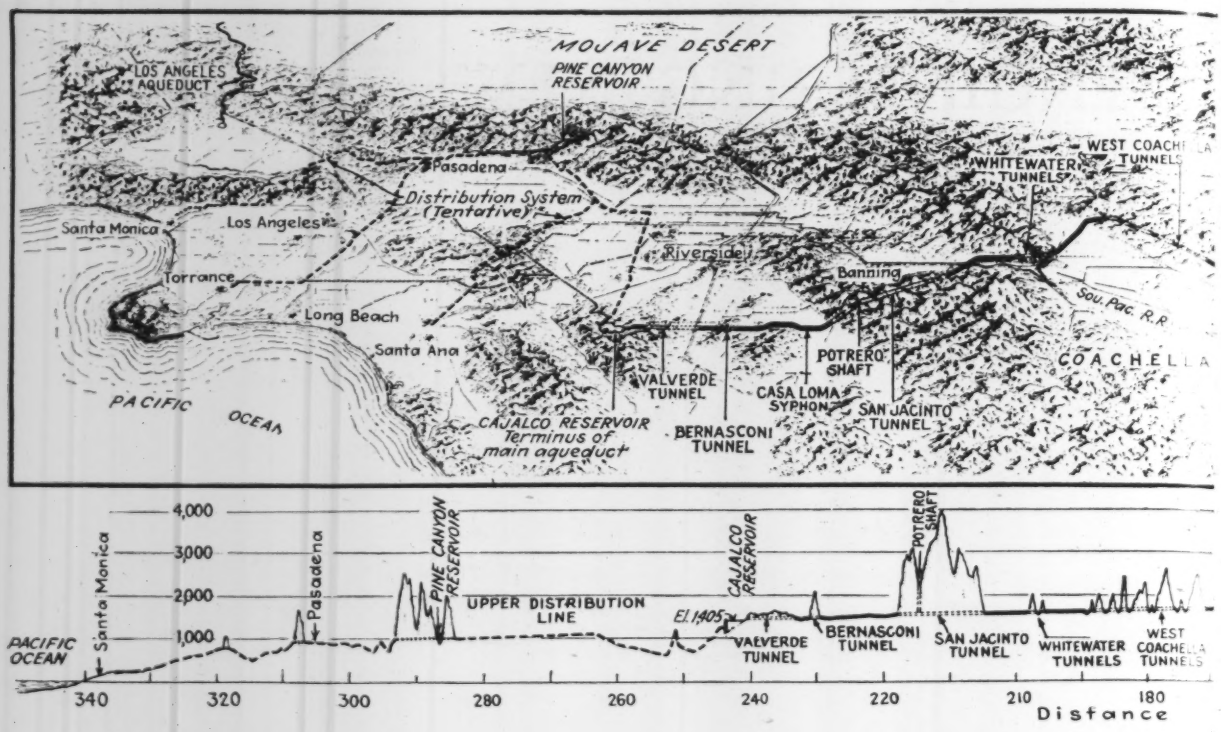


FIG. 2—WEST HALF of the Colorado River Aqueduct from the West Coachella tunnels to the Los Angeles area.

is being driven by forces directly in the employ of the district, consisting of ten tunnels in the San Bernardino Mountains. The location and relative lengths of the tunnels are listed in the accompanying table.

For the most part the tunnels are uniformly 16 ft. in finished diameter, only the two western tunnels, the Valverde and Bernasconi, being of different size; because of a steeper grade toward the western end of the aqueduct, these two tunnels are 15 ft. 3 in. in diameter. Concrete lining will be used throughout. Thus, rough excavation is made to an 18-ft. diameter, which gives about 12.95 cu.yd. of excavation per linear foot in timbered sections and 10.76 cu.yd. in unsupported sections. The saving in excavation for sections in which steel instead of timber supports are used, notably the Whitewater tunnels, amounts to about 1.34 cu.yd. per linear foot, while the saving in concrete amounts to 0.85 cu.yd. The standard tunnel grade is 3.432 ft. per mile, giving a maximum capacity of 1,605 sec.-ft.

Of the 91-mile total length of aqueduct tunnels, 30.52 miles, or 33 per cent, had been completed on July 1. In this portion of the work steel or timber supports for holding the ground had been used in about 54 per cent of the length driven. Practically no temporary timber support has been used, but gunite has been quite extensively employed for this purpose and also to prevent spalling due to air slacking.

Auxiliary operations

Because the date of completion of the aqueduct will be governed by speed of tunnel driving, every endeavor is being made to obtain good driving records. The longest distance between headings is the 8.22-mile length between the Cabazon and Potrero shafts of the 12.77-mile San Jacinto tunnel contract. The district is driving an 18-mile tunnel in the Coachella District, which is being worked from four adits, the longest distance between headings in this case being 5.88 miles.

The district has constructed and maintains a main highway system generally paralleling the aqueduct, and from 1 to 10 miles distant from the several tunnel camps. The contractors have built the branch roads to their operations at their own expense.

Water, obtained from wells along the line, is furnished by the district to the contractors through 180 miles of pipe line adjacent to the main highway. The district provides a connection at some point convenient to the contractor, and the contractor supplies his own pumping facilities. The district charges 15c. per 100 cu.ft. for all water consumed by the contractors. This water-supply development for construction operations was described in detail in *ENR*, Jan. 4, 1934, p. 13.

Electric power is transmitted over 428 miles of 66,000- and 33,000-volt lines covering the entire aqueduct. The power is obtained by the district under an agreement with the Southern California Edison Co., the Southern Sierras Power Co. and the Los Angeles Gas and Electric Corp., and is resold to the contractors. The rate for power is established at 1c. per kw.-hr., provided the average power factor of the contractor's load is 95 per cent or better. An additional charge of 0.04 mill per kw.-hr. is made for each 1 per cent that the average power factor falls below 95 per cent. The power line and other services were outlined in *ENR*, May 25, 1933, p. 678.

Telephone service is furnished by the district at a charge of 10c. per call through one exchange, or 50c. through more than one exchange. Connections at the district's field office at Banning can be made with the lines of the Southwestern Home Telephone Co.

A splendidly equipped hospital is maintained by the district at Berdoo, the headquarters camp of the force-account section. This hospital has 26 beds, modern surgery and X-ray apparatus, is air-conditioned and has individual radio sets at each bed. The contractors provide their own camps and make their own arrangements for hospital and medical care. On account of the excessive heat many of the camps are equipped with air-cooling systems. Of the seventeen camps erected by the contractors eleven are operated under concession by commissary companies. The contracts with the district provide that the contractors may charge a maximum of $1.15 per day for meals and 25c. per night for lodging. The same scale of charges is maintained by the district in its eight force-account camps.

Working conditions

The contractors are required to pay minimum wages for the several cla-si-

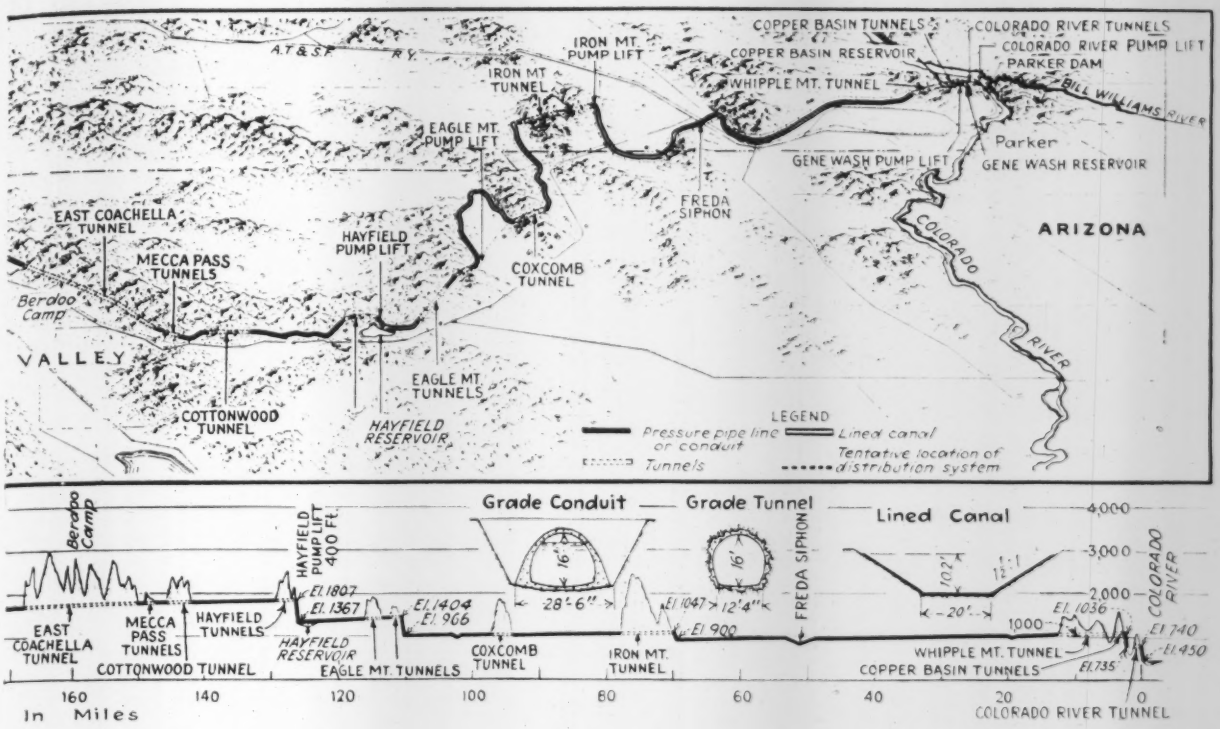


FIG. 2—EAST HALF of the Colorado River Aqueduct from Parker Dam to the East Coachella tunnel.

fications of labor according to the following scale:

Class.	Per-Diem Wage	Class.	Per-Diem Wage
Blacksmith	$6.00	Miner, machine-man	5.60
Carpenter	6.00	Miner, chuck-tender	5.20
Carpenter, form-work	5.60	Motorman	5.20
Compressorman	5.00	Mucking-machine op.	8.00
Conc. equip. op.	5.20	Painter	6.00
Conc. finisher	5.60	Plasterer	7.20
Dragline or shovel op.	9.00	Plumber	7.20
Dragline or shovel ass't	5.20	Powderman	6.00
Driller, jackhammerman	5.00	Roofer	6.00
Electrician, lineman	7.20	Sheet metal worker	7.20
Fence erector, steel	5.60	Steamfitter	7.20
Graderman, road-mach. op.	5.60	Steel worker, reinf. steel	5.20
Hoist, derrick, crane op.	6.00	Tilesetter	7.20
Laborer	3.80	Timber framer	5.60
Lather	6.00	Tractor driver	5.00
Mason	7.20	Trench-machine op.	6.00
Mechanic, repairman, pipeman	6.00	Truck driver	5.00
		Welder	7.20
		Miscellaneous not less than	3.20

Penalties are provided for failure to pay at least these stipulated rates. Work is limited to 8 hours in any calendar day, and penalties are imposed for working men overtime unless in an emergency causing danger to life or serious loss of property.

All public-works construction in California is limited by law to six days per week. Two ways of meeting this requirement are used on the aqueduct: (1) operating full time continuously for a two-week period and then closing down entirely for a two-day week-end; and (2) alternating days of leave for different members of the crews so that each man gets one day off in seven, although a crew works seven days each week. The former method is used quite generally on the aqueduct, largely because all workers are required to be residents of the district and a two-day layoff permits them to make the journey home, whereas it could not comfortably be accomplished in one day.

The contractors are responsible for the proper and adequate construction of the tunnel in accordance with the plans and specifications and are responsible for all losses or damage generally classed as "force majeure," except that in case of earthquake the contractors are not liable for any expense for damage in excess of $5,000 for each earthquake. They are required to provide sanitary camps, pure water supplies, proper sewage disposal and adequate fire protection, all in accordance with the laws of California. The State's Industrial Accident Commission has jurisdiction in the matter of safety rules and regulations and may impose fines for infractions of its published rules.

The district maintains a department of safety engineering whose duty is the inspection of the force-account tunnels on matters of safety and the training of first-aid classes and mine rescue squads. More casual inspection is made by this same department on the contract tunnels, and the attention of the contractors is called to any violations of the safety or sanitary codes that are noted on their work.

Rates of progress

In general, progress on the aqueduct tunnels has been very good. The competitive element has been introduced on the district force-account work by awarding pennants for the camps making best progress, lowest labor cost and best safety record. These awards are made each month. A highly competitive spirit also exists between the several contractors and the district camps, merely for the glory of "beating the other fellow."

Table 1 shows the progress to July 1, 1934. The best records for a week, average per shift and best monthly record for single headings in each of the camps are also shown. On account of the different numbers of shifts worked at the several camps on the aqueduct any fair comparison of progress must be on a shift basis and not on a weekly or monthly basis.

The formations encountered vary widely, even in the same headings. In general, the rock encountered is gneiss, certainly pre-Cretaceous in age and possibly pre-Cambrian, with intrusions of granite and granodiorite of a lesser age. The formations are badly contorted and generally thoroughly fractured, with a lack of cohesion that requires support in tunneling. Frequent fault zones, long inactive, are frequently encountered, and many of these require careful work, which greatly retards progress. An exception to these conditions is found in the Whitewater tunnels, which pass through a sedimentary formation classed as older Quaternary gravel. Rather contrary to expectations, this has proved to be excellent material for tunneling. Steel liner plates have been used throughout the Whitewater tunnels for support, and

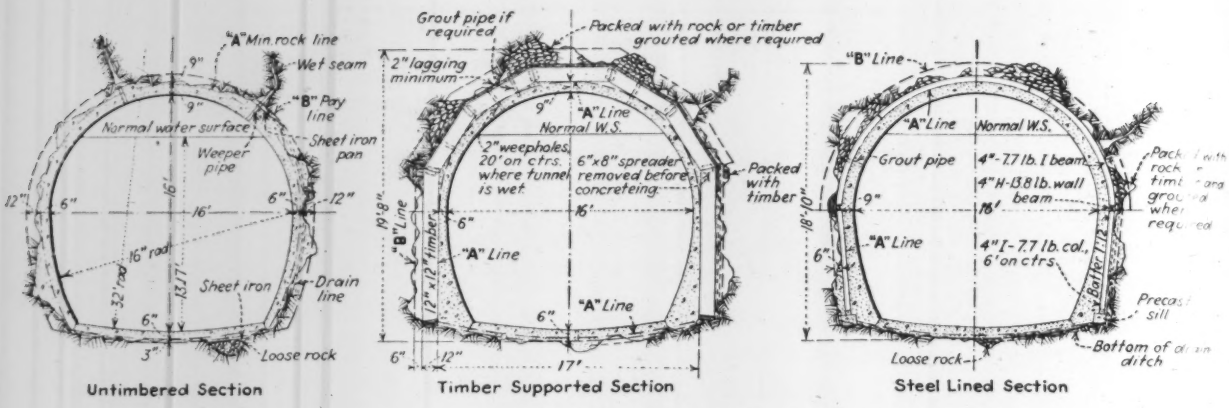


FIG. 3—TYPICAL SECTIONS of tunnel on Colorado River Aqueduct, showing timbering for bad rock locations. The steel-lined section is used most extensively in the Whitewater tunnels, where gravel is encountered.

progress has been rapid and consistent and the cost has been low.

Full-face tunneling with jumbos

Despite widely varying conditions in the aqueduct tunnels, one important feature in the plan of operations that is universally used is the full-face heading instead of pilot tunnel or heading-and-bench method. It is believed that working the full face does not increase powder and mucking costs, and there is the twofold advantage of making it convenient to use automatic-feed drills and to drill the entire heading from one setting of the drilling jumbo.

Automatic-feed drills are now used in about 80 per cent of the headings and are commonly accepted as easier on the men. The drills are heavier than the old screw-feed machines, but on the jumbo they can be used with the same facility as could the lighter equipment. In the long run, taking the average, the automatics show better over-all speed than would hand-feed drills even with specially coached operators. They are decidedly quicker in getting the steel out of the hole and in overcoming the tendency of drills to stick.

The use of drill carriages, or jumbos, also is quite general. They save time by providing men at the face not only with a very convenient mounting for all the drills (usually five or six), but with tools, equipment and service connections ready to hand. In short, the rule is "Put everything on the jumbo."

There are two rather distinct types of drill carriage. The one most generally used, known as the Metropolitan jumbo, is a double-deck car on 3-ft. gage, about 20 ft. long, with upper side platforms that fold down to the sides when the carriage is not in use. The drills are mounted on columns and arms fixed to the front of the carriage. Connections for air and water lines with manifolds for making connections to the drills are provided on each side of the carriage. The drill steel is usually loaded on the platforms prior to moving the carriage to the face; generally drilling begins within 5 min. after the carriage is moved in from the side track.

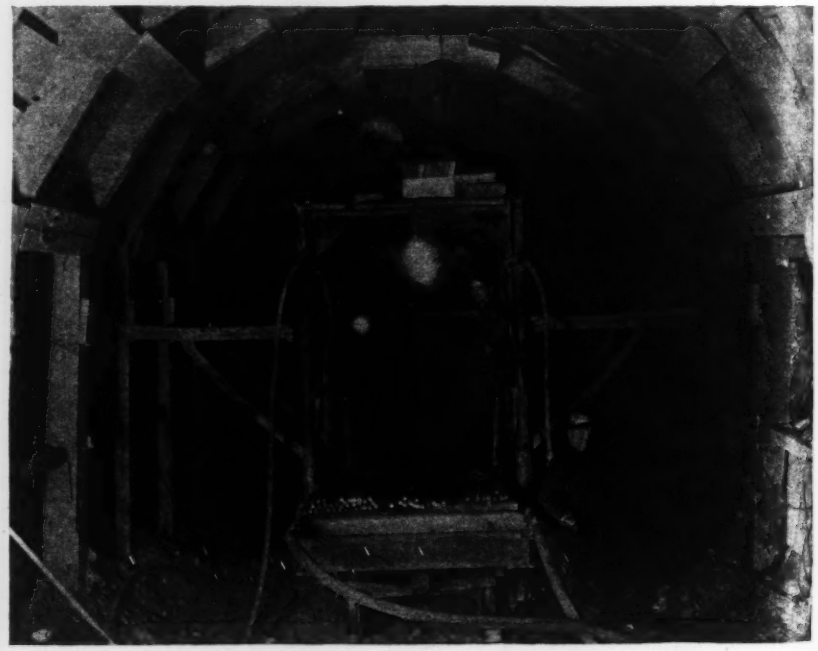
Another type of drill carriage (used in seven of the headings) is the King "grasshopper." This is a combination car passer, drill carriage and timber jumbo. It is a structural-steel frame about 150 ft. long, mounted on wheels that run on a separate track having a gage of about 10 ft. Empty cars (usually six or eight) are pulled up a hinged ramp at the rear of the grasshopper, to its upper deck, and are then lowered one at a time down a similar hinged ramp at the front to the mucker. The loaded cars are drawn back under the grasshopper (after the front ramp is raised) with a locomotive until the entire train is loaded, when a fresh string of empties is pulled up the grasshopper and the loaded train is run out of the tunnel. The ramps are raised and lowered by air hoists.

In two headings the muck is loaded on to long belt conveyors, the entire train being drawn under the discharge end of the conveyor as the cars are loaded. These structures also have the drills mounted on the front end and, as in the grasshopper, require their own broad-gage track on which to operate.

Five headings use a combination drill carriage and car passer in which the empty car is raised vertically to permit the passing of the loaded muck cars.

Adoption of the full-face method has in nowise resulted in uniformity in placing the holes or in firing order. Rock formation controls depth of holes to a large extent, and each superintendent has his own ideas as to arrangement of holes in the round. Three typical rounds as used on the district

FIG. 4—DRILLING JUMBO used on all force-account work, showing set-up at the face. Drills are mounted on the front end of the carriage, which carries all steel and supplies for the round. Note air and water connections, also timbering.



force-account work are shown in Fig. 7. In general, 3½-in. drills are used, although one or two contractors have some 4-in. drills.

The amount of explosive necessary to break the ground has also varied widely, ranging from less than 1 lb. per cu.yd. in the gravels and some of the softer rocks to more than 6 lb. in the harder formations. The average consumption of powder on the force-account work has been 2.4 lb. Generally low-freezing special gelatin dynamite is employed, 40 per cent strength being used in the cut holes and 25 per cent in the other holes. Sometimes in the softer formations the back holes are drilled but not loaded; and if the round does not break to the holes, they are loaded and fired later. In a few cases 60 per cent powder is used in the cut. As typical of overbreak, the Coachella tunnels may be cited in which the figures are 1.1 per cent in unsupported tunnel and 7.2 per cent in timber-supported tunnel.

In general, all of the headings have independent crews in each heading, rather than using the alternating method where drilling and mucking crews alternate between two headings. Although the latter method is conceded to be economical when the distance between headings is not too great, the independent method has worked out as more practical due to the extreme lack

TABLE I—PROGRESS DATA ON TUNNELING OPERATIONS

July 1, 1934

Tunnel (In order from East to West)	Contractor	Date of Award	Length in Feet		Completed	Record to Date			
			Total	Driven to July 1, 1934		Day Ft.	Week Ft.	Month	
								Total Ft.	Av. Ft Per Shift
Colorado River	Walsh Const. Co.	6–16–33	5,515	468	9	0	210	468	6.8
Copper Basin No. 1			752	752	100		153	649	7.0
" " " 2 E.			1,878	1,878	100	31	154	562	6.0
" " " W.			9,702	4,307	45	**39	237	807	9.0
Whipple Mt. E.			18,352	4,133	22	35	193	798	8.9
" " W.			13,913	3,492	25	32	168	638	7.2
Iron Mt. (E. Sec.) E.	Winston Bros. Co.	4–21–33	9,844	1,794	18		97	388	5.9
" " " W.			13,743	4,282	31	37	176	712	8.8
Iron Mt. (W. Sec.)	Utah Const. Co.	4–21–33	16,172	7,099	45	*47	315	1,027	11.4
						31	174	690	7.4
Coxcomb Mt.	Winston Bros. Co.	4–21–33	17,795	5,314	30	35	183	652	8.4
East Eagle Mt.	Broderick & Gordon	2– 5–34	9,442	122	2			122	1.6
West Eagle Mt. (E. Sec.) E.			7,871	1,774	23	22	122	471	5.8
" " " " W.		6– 2–33	7,974	1,066	13	24	96	347	4.5
West Eagle Mt. (W. Sec.)	L. E. Dixon & Bent Bros.	6– 2–33	10,649	5,138	48	35	180	702	9.4
Hayfield No. 1 E.	Hunkin-Conkey Cons. Co.	6– 2–33	5,317	1,682	32	19	112	328	6.1
" " W.			4,360	1,352	31	20	105	356	6.6
Hayfield No. 2	Shofner & Gordon	6– 2–33	5,375	2,564	48	25	114	379	7.0
Cottonwood—E. Sec.	J. F. Shea Co., Inc.	4–21–33	10,114	6,179	63	44	227	791	10.0
" W. "			9,991	5,849	59	36	186	716	9.0
Mecca Pass No. 1	Morrison-Knudsen Co.	6– 2–33	338	338	100		84	225	4.9
" " " 2			997	296	30		84	274	4.1
" " " 3			4,605	4,605	100		236	782	9.7
East Coachella—96610′									
Yellow Adit E.	Met. Water Dist. Force Acct.	2– 1–33	10,204	5,908	60	43	196	663	8.5
" " W.			10,076	5,677	57	45	202	772	10.3
Forge " E.			11,850	5,113	43	44	171	639	7.8
" " W.			15,200	4,627	30	31	150	552	7.7
Berdoo " E.			15,824	6,108	39	41	209	791	9.8
" " W.			12,456	5,896	48	39	216	774	9.6
Pushawalla Adit E.			10,186	3,514	36	32	142	576	7.1
" " W.			10,814	3,827	39	44	227	797	9.8
Thousand Palms No. 1	Met. Water Dist. Force Acct.	2– 1–33	16,058	5,344	33	48	176	555	7.1
" " " 2			3,838	3,838	100	40	156	586	7.5
Wide Canyon No. 1 E.			5,112	1,573	31	30	143	534	7.1
" " " W.			9,183	5,103	56	37	160	575	7.1
Seven Palms E.			8,390	4,371	52	42	158	600	7.4
" " W.	Met. Water Dist. Force Acct.	2– 5–34	8,340	984	12		144	548	7.0
Long Canyon E.			8,360	1,056	13		149	576	7.4
" " W.			6,880	0	0				
Blind Canyon W.			6,788	852	13		120	496	6.4
Morongo No. 1 E.			5,512	610	11		112	441	5.7
" " 2 E.			1,790	0	0				
Whitewater No. 1 W.	West Constr. Co.	6–16–33	2,060	35	2	†			
" " 2 E.			8,146	6,529	80	45	233	910	11.2
San Jacinto 67415′									
Cabazon Shaft E.	Wenzel & Henoch	2–10–33	8,553	670	8	20	83	187	2.1
" " W.			22,839	2,388	11	27	191	767	8.5
Potrero Shaft E.			20,589	160	1		30	77	1.2
" " W.			6,712	223	3		80	137	1.6
West Portal			8,722	1,843	21			314	3.5
Bernasconi E.	Hamilton & Gleason	4– 7–33	6,220	3,718	60	25	108	406	7.0
Valverde—38077′									
Shaft No. 1 E.	Dravo Contracting Co.		2,140	1,607	75	30	148	475	5.9
" " W.			1,525	1,068	70	14	83	255	3.0
Shaft No. 2 E.			5,400	3,696	68	26	129	520	6.4
" " W.			5,400	3,550	67	26	139	505	6.0
Shaft No. 3 E.			6,950	2,450	35	30	166	423	5.6
" " W.			6,950	3,482	50	26	127	480	5.7
Adit No. 4 E.			5,117	0	0	Tunnel	not	started	
" " W.			5,283	0	0				
Total tunnels (contract)			307,304	95,903	31				
(in miles)			58.20	18.16					
Total tunnels (force acct.)			177,719	65,249	37				
(in miles)			33.66	12.36					
Grand Total			485,023	161,152	33				
(in miles)			91.86	30.52					

* Sand Tunnel. ** Rock Tunnel. † Gravel Tunnel.

of uniformity in the ground, timbering often being required in one heading while the opposite heading is driven unsupported.

Depth of drill holes has ranged from 5 to 15 ft., while the number has varied from 12 to 60. The only heading where twelve holes have sufficed is the Whitewater tunnel, a gravel formation very lightly cemented in places; even in these headings there are more frequently 18 to 24 holes driven 8 to 10 ft. deep. In this formation it has been found desirable to protect the side walls at the face by omitting from each round the bottom drill hole along each side and including this in the next round. This makes final clean-up always one round behind, but it gives closer conformity to section and less muck yardage.

Drilling time has the usual wide variation and ranges from one hour for a few holes in lightly cemented gravel to five or six hours for 50 to 60 deep holes in hard granite.

Experience with the several methods

TUNNEL-EXCAVATION EQUIPMENT IN USE ON COLORADO RIVER AQUEDUCT

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Tunnel	Contractor	Access Type and Length	Total Length, Ft.	Drills	Hauling: Locomotives	Hauling: Cars	Muckers	Car Switching	Ventilation No., Type, Capacity, c.f.m.	Compressors No. and Displaced Capacity, c.f.m.
Colorado River	Walsh Constr. Co.	W. Port.	5,515	10A.	1- 8 T. Comb.	22-5 Y, S.D.	1 Conv.			1-1,400
Copper Basin	Walsh Constr. Co.	W. Port.	689	16A.	Tunnel driving not yet started					
		for No. 1			1-12 T. Gas.	16-4 Y, S.D.	2 Conv.	1 V.Ch.Pkr.	2C- 6,000	2- 800
Nos. 1 and 2		Adit 330'	E 1,878		3- 8 T. Comb.	8-5 Y, S.D.		1 Gr.Hpr.	1P- 6,000	1- 600
		for No. 2	W 9,702						2C- 5,000	
Whipple Mt.	Walsh Constr. Co.	Adit. 924'	E 18,352	16A.	3- 8 T. Comb.	20-4 Y, S.D.	2 Conv.	2 Gr.Hpr.	2C- 6,000	2- 800
			W 13,913		1-12 T. Gas.	12-5 Y, S.D.			2C- 5,000	1- 600
Iron Mt.	Winston Bros.	Shaft 165'	E 9,844	3N.A.	3- 8 T. Bat.	50-4 Y, Mine	1 Conv.	1 Ch.Pkr.	2C- 7,000	3- 800
East portion			W 13,743	6A.			1 Shov.	1 jib. drk.		
Iron Mt.	Utah Constr. Co.	W. Port.	16,172	6N.A.	2- 8 T. Gas.	25-5 Y, Mine	2 Conv.	1 Ch.Pkr.	2P- 7,550	2- 800
West portion				2A.	3- 8 T. Bat.					1- 850
Coxcomb	Winston Bros.	E. Port.	17,795	6A.	2- 8 T. Bat.	25-4 Y, S.D.	1 Shov.	1 jib. drk.	2C- 7,000	3- 800
East Eagle Mt.	Broderick & Gordon.	W. Port.	9,442	5A.	2- 8 T. Comb.	20-5 Y, S.D.	1 Conv.	1 ch.pkr.	1P- 5,500	1-700 1-1,100
West Eagle Mt.	Broderick & Gordon.	Adit. 2,008'	E 7,871	5A.	2- 8 T. Comb.	20-5 Y, S.D.	2 Conv.	Conv. loader	1C- 6,000	2- 700
East portion			W 7,974							1-1,100
West Eagle Mt.	L. E. Dixon and Bent Bros.	W. Port.	10,649	7N.A.	2- 7 T. Bat.	22-5 Y, S.D.	1 Conv.	Conv. loader	2C- 7,000	1- 750
West portion										1- 500
Hayfield No. 1	Hunkin Conkey Constr. Co.	Adit. 511'	E 5,317	16A.	4- 5 T. Bat.	16-4 Y, S.D.	3 Conv.	2 ch.pkr.	1C- 4,000	1- 750
			W 4,360		1- 4 T. Gas.				1C- 8,000	1- 720
										1- 270
Hayfield, No. 2	Shofner & Gordon.	W. Port.	5,375	5A.	3- 6 T. Bat.	20-5 Y, S.D.	2 Conv.	1 v.ch.pkr.	2C- 5,000	2- 750
					1- 8 T. Gas.					1- 650
Cottonwood	J. F. Shea, Inc.	E. Port.	10,114	5A.	2- 8 T. Trol.	18-4 Y, S.D.	1 Conv.	1 gr.hpr.	1P- 6,400	1-1,100
East portion					1- 8 T. Gas.					
Cottonwood	J. F. Shea, Inc.	W. Port.	9,991	5A.	2- 8 T. Trol	15-4 Y, S.D.	1 Conv.	1 gr.hpr.	1P- 6,400	1- 888
West portion					1-14 T. Gas.				1C- 3,500	
Mecca Pass	Morrison-Knudsen.	W. Port.	E 1,335	12A.	1- 8 T. Gas.	19-4 Y, S.D.	2 Conv.	1 gr. hpr.	1P- 6,400	2- 630
Nos. 1, 2, and 3		Nos 1 & 2		6N.A.	3- 5 T. Bat.				1C- 3,000	1- 370
		E. Port, No. 3	W 4,605		1- 8 T. Gas.					
E. Coachella	Force ac.	Adit 686'	E 10,204	13A.	3- 8 T. Bat.	24-5 Y, S.D.	3 Conv.	2 Cal. sw.	2C- 7,640	2- 854
Yellow Camp			W 10,076		1-5½ T. Bat.					
E. Coachella	Force ac.	Adit 891'	E 11,850	13A.	3- 8 T. Bat.	25-5 Y, S.D.	2 Conv.	2 Cal. sw.	2C- 7,640	2- 854
Fargo Camp			W 15,200		1-5½ T. Bat.		2 Shov.			
E. Coachella	Force ac.	Adit 2,042'	E 15,824	12A.	3- 8 T. Bat.	25-5 Y, S.D.	3 Conv.	2 Cal. sw.	2C- 7,640	2- 854
Berdoo Camp			W 12,456	4N.A.	1-5½ T. Bat.					
E. Coachella	Force ac.	Adit 2,935'	E 10,186	12A.	3- 8 T. Bat.	25-5 Y, S.D.	3 Conv.	2 Cal.sw.	2C- 7,640	3- 854
Pushawalla Camp			W 10,814	4N.A.	1-5½ T. Bat.					
W. Coachella	Force ac.	W. Port.	E 16,058	12A.	3- 8 T. Bat.	25-5 Y, S.D.	3 Conv.	2 Cal.sw.	2C- 7,640	2- 854
Thousand Palms		1,000 Palms #1			2- 8 T. Gas.				2C- 5,000	
		E. Port.	W 8,960	1N.A.	1-5½ T. Bat.					
W. Coachella	Force ac.	Wide Canyon #1								
		W. Port.	E 9,183	12A.	2- 8 T. Bat.	24-5 Y, S.D.	2 Conv.	2 Cal.sw.	4C- 7,640	2- 854
Wide Canyon		Wide Canyon #1			2-5½ T. Bat.					
		E. Port.	W 9,238	1N.A.	1- 8 T. Gas.					
W. Coachella	Force ac.	Seven Palms								
		W. Port.	E 8,340	12A.	1- 8 T. Gas.	14-5 Y, S.D.	2 Conv.	2 Cal.sw.	2C- 7,640	2- 600
		Seven Palms			1- 4 T. Gas.					
		E. Port.	W 8,360		2- 8 T. Bat.					
Long Canyon		Long Canyon								
		W. Port.	E 13,668	12A.	1-10 T. Gas.	14-5 Y, S.D.	2 Conv.	2 Cal.sw.	2C- 7,640	1-1,100
W. Coachella	Force ac.	Blind Canyon		2N.A.	3- 8 T. Bat.					1- 600
		E. Port.	W 7,302							
Little Morongo		Morongo No. 1								
Whitewater No. 1	West Constr. Co.	W. Port.	2,060	Tunnel not yet started.						
Whitewater No. 2	West Constr. Co.	E. Port.	8,146	6N.A.	2- 9 T. Bat.					
San Jacinto	Wenzel & Henoch	Shaft 246'	E 8,553	10A.	3- 8 T. Trol.	30-4 Y, Mine	1 Shov.	1 jib. drk.	1P- 4,000	1- 631
Cabazon		Cross Drift 935'	W 22,839			1-12 Y, S.D.	3 Conv.	1 ch.pkr.	1C-10,000	2- 860
						15-5 Y, S.D.		1 Cal. sw.		2- 750
										1- 630
San Jacinto	Wenzel & Henoch	Shaft 796'	E 20,589	8N.A.	1-3½ T. Gas.	None as yet	2 Conv.	2 Cal.sw.	1C-10,000	2- 860
Potrero			W 6,712							1- 750
										1- 631
San Jacinto, West Portal	Wenzel & Henoch	Adit 238' at Port.	8,722	6N.A.	2- 8 T. Trol.	12-2 Y, Mine	2 Conv.	1 ch.pkr.	2C- 4,500	2- 630
Bernasconi	Hamilton & Gleason.	E. Port	6,220	5N.A.	1- 8 T. Gas.	17-4 Y, S.D.	1 Conv.	1 gr.hpr.	1C- 4,000	2- 750
					2- 5 T. Bat.					
Valverde	Dravo Contr. Co.	Shaft 64'	E 1,452	8N.A.	2-12 T. Bat.	9-3 Y, Flat	1 Conv.	1 split sw.	1P- 3,000	from shaft #2
Shaft No. 1			W 1,525							
Valverde	Dravo Contr. Co.	Shaft 204'	E 5,400	17N.A.	4- 6 T. Bat.	29-3 Y, Mine	2 Conv.	2 v.ch.pkr.	2P-13,300	2-1,722
Shaft No. 2			W 5,400							1- 900
Valverde	Dravo Contr. Co.	Shaft 192'	E 6,950	12N.A.	5- 6 T. Bat.	38-3 Y. Mine	2 Conv.	2 v.ch.pkr.	2P-10,000	2-1,600
Shaft No. 3			W 6,950							1- 700
Valverde	Dravo Contr. Co.	Shaft	E 5,000		Tunnel driving not yet started.					
Shaft No. 4			W 5,400							

Notes on Abbreviations:

Col. 3 and 4, access and total length:
E —east
W —west
Port. —portal

Col. 5 drilling:
A. —automatic
N.A —non-automatic

Col. 6 hauling, locomotives:
T. —ton
Gas. —gasoline
Comb. —combination battery and trolley
Bat. —battery
Trol. —trolley

Col. 7 hauling, cars:
Y. —cubic yards
S.D. —side dump

Col. 8 muckers
Conv. —conveyor type
Shov. —shovel type

Col. 9 car switching
V.ch.pkr. —vertical cherrypicker
Ch.pkr. —cherrypicker
Gr. hpr. —Grasshopper or ramp passover
Jib. drk. —jib derrick mounted on shovel
Dbl. trk. —double track with switches
Cal. sw. —California switches
Conv. loader —Conveyor loader

Col. 10 ventilation:
C. —centrifugal compressor blowers.
P. —Positive pressure blowers

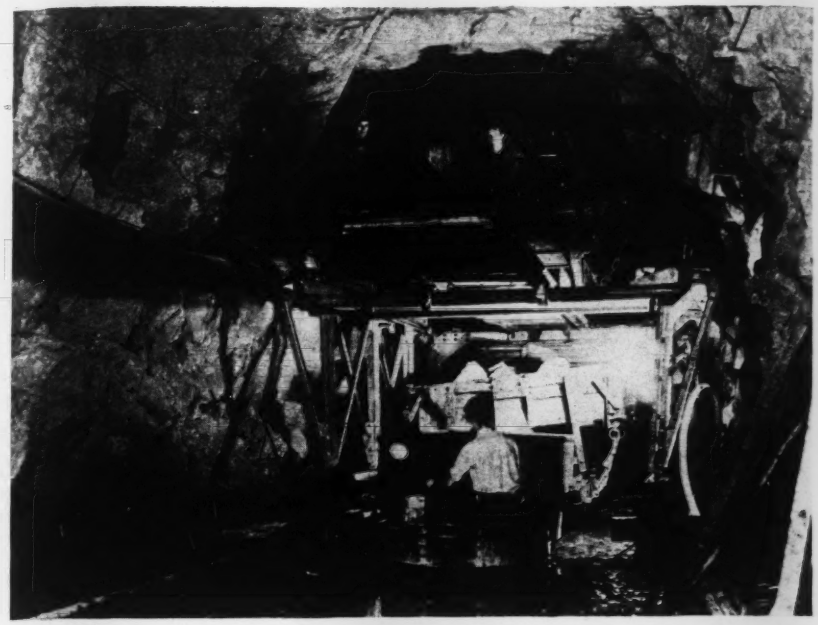


FIG. 5—"GRASSHOPPER" used at seven headings, which is a combined drill carriage, car passer and timbering jumbo. View shows rear end of 150-ft. steel frame with hinged ramp at either end. Empty cars (one is shown on upper-level track) are switched over the upper track and down to the mucker while loaded cars are taken out the lower track, as shown. This is a typical unsupported rock section.

of car switching described in an earlier progress article (*ENR*, Feb. 1, 1934, p. 131) has not entirely settled differences of opinion. The California-type switch (slightly elevated sidings, crossovers by means of superimposed vertically feathered rails, similar to those used on street railway work) has been adopted by the district as standard. With this type of equipment a loaded muck car can be removed and replaced by an empty in 45 sec., as compared to the 90 sec. for some of the other types. Moreover, these sidings are light and easy to move, not over 30 min. being required to move 60 to 80 ft. Thus they can be kept up close to the heading practically all of the time. The loaded cars are removed with a locomotive, and an empty is pulled to the mucker by a tugger hoist.

The grasshopper, the vertical lifter and the belt conveyor, already described, constitute the three other main types of car passers in use, although there will occasionally be found the older type of "cherrypicker," which lifts the empty car clear of the track and holds it to one side while the loaded car is drawn past. The great disadvantage of this type of car passer is that the track has to be shifted from center to side and back to the center again, an operation costing more than $1 per foot.

In three cases non-revolving shovels are used as muckers. These have jib cranes mounted on the rear of the shovel, which pick the empty car off the track while the locomotive removes the loaded car. This device is the fastest of the car passers but has the disadvantage of having to move the track from the side to the center of the tunnel before concrete-lining operations can be started.

Loading and hauling

Much improvement has been made in mucking machines in recent years, and machines on this job are very decidedly of heavier and more rugged construction than were earlier models. Nevertheless, it is considered good practice to have one spare machine for two in service, i.e., at an adit camp where headings are being driven east and west a mucking machine will be kept in each heading and a spare in the shop at camp.

Sixty-two mucking machines of the conveyor type and five 1¼-cu.yd. power shovels are in use in the aqueduct tunnels, as shown in the accompanying table. All are electrically operated. The time required for mucking out a round of some 130 cu.yd. ranges from 1½ to 3 hours, depending upon material and operator.

Some 84 locomotives are used on the aqueduct tunnels for hauling muck trains. Most are of storage-battery type, although some contractors use the trolley system to do away with the need for a battery-charging station. Higher speeds and greater hauling capacity are also characteristic of the trolley locomotive, but they have the disadvantage of hazard from the exposed trolley and the inconvenience of handling near the face beyond the limit to which the trolley wire can be carried. In some cases travel in this area is accomplished by means of a reel of cable that is mounted on the locomotive and pays out as the locomotive advances, the end of the cable being contacted to the end of the trolley. Others employ a combination trolley and storage-battery locomotive, the battery being brought into service beyond the limits of the trolley wire. In addition, about 17 gasoline locomotives are used on the dump and for yard work. The locomotives weigh from 4 to 12 tons, and

FIG. 6—MUCKING MACHINES of the conveyor type, electrically driven, are used in almost all the headings. Time for mucking a round of 130 cu.yd. varies from 1½ to 3 hours.

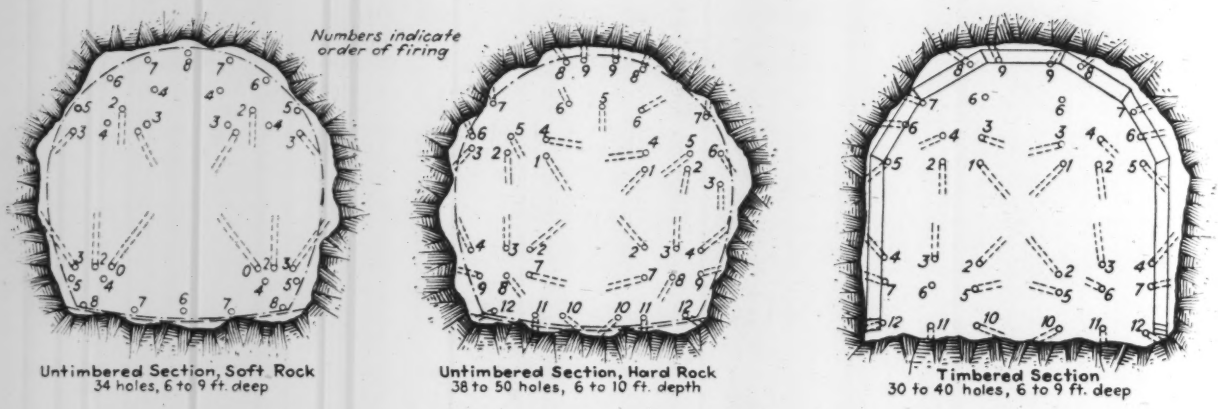

Numbers indicate order of firing
Untimbered Section, Soft Rock
34 holes, 6 to 9 ft. deep
Untimbered Section, Hard Rock
38 to 50 holes, 6 to 10 ft. depth
Timbered Section
30 to 40 holes, 6 to 9 ft. deep

FIG. 7—DRILLING DIAGRAM for full-face driving on District force-account work.

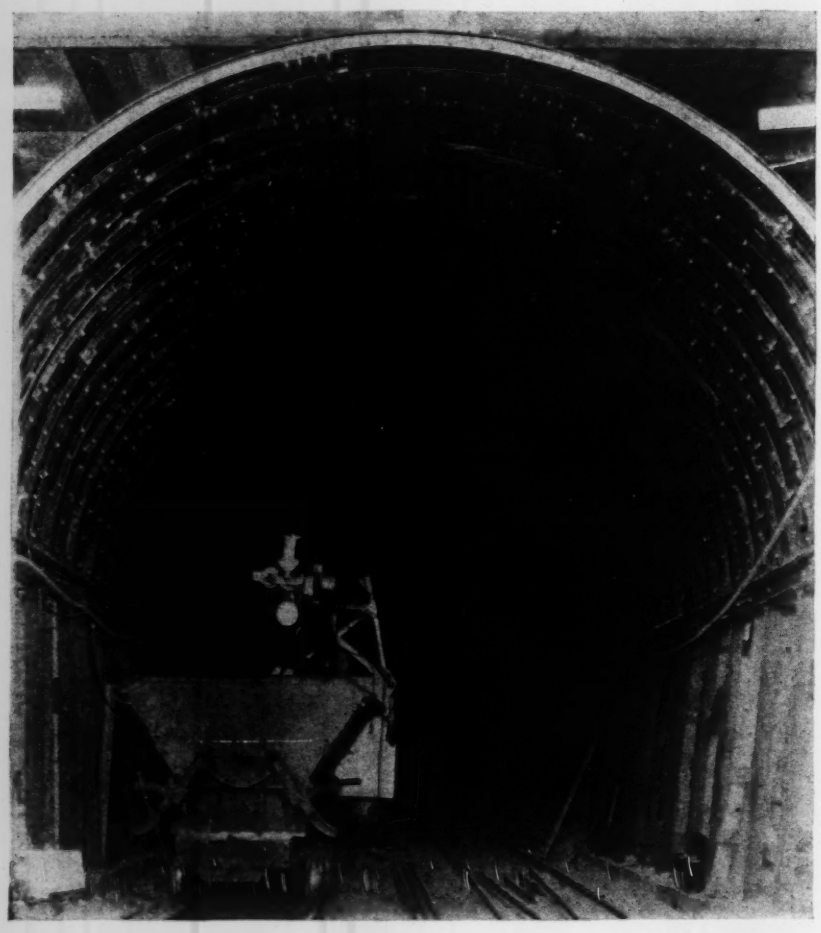
ordinarily take eight to ten cars of 4- or 5-cu.yd. capacity—the most common size—although some cars as small as 3 cu.yd. are used on the west end. Tunnel track of 3 ft. gage with 40-lb. rail is universally employed.

The tunnel grades are practically negligible, the general grade being only 3.3 ft. per mile. The adits usually slope outward on a grade of 0.5 per cent, although in one or two cases the contractors have shortened the adits by reversing the grade to as much as 1 per cent up from the tunnel to the surface.

All tunnels that portal under the ground surface are approached with inclines having grades ranging from 3 to 10 per cent, the cars being drawn up with hoists on the steeper grades. The dumps are generally level, although in a few cases they have been carried on slight upgrades in order to increase the capacity of the dump.

The longest hauls will be on the San Jacinto tunnel, where the distance between Cabazon and Potrero shafts is 43,400 ft. With equal progress in both headings, the haul would be one-half this figure, but as driving was started at Cabazon several months in advance of Potrero it is probable that the maximum haul will probably be in excess of 22,000 ft. (4.2 miles). The east heading at the Berdoo adit of the Coachella tunnel will probably advance over 16,000 ft. from the adit, and this, added to the 2,000-ft. length of the adit, will give a maximum haul of more than 18,000 ft. (3.5 miles). Most other hauls are less than 2 miles in length, although in a few cases 3 miles is approached.

FIG. 8—STEEL-LINER SUPPORT has been used to some extent on several headings and exclusively in the Whitewater tunnel, as shown, which was driven through dry gravel.



Ventilation

The usual air-compressor equipment and practice prevail at the aqueduct camps. Ventilation is provided by 20- or 22-in. steel pipes supported by brackets in the tunnel walls near the spring line. (In a few cases auxiliary blowers with canvas pipe are used at the face.) Forced draft is used with provision for reversal for a 15- to 20-min. period after blasting, to suck out powder fumes. Crews normally return to the headings in less than 10 min. after blasting. (California law now requires a wait of 5 min.) Occasionally booster fans are hung in the tunnels near portals or adits, blowing outward, to give acceleration to outgoing air. Also, jets of compressed air are occasionally released at headings to cool and freshen the air close up to the working face.

Timbering

Despite the fact that much of the tunnel mileage is in rock, about 54 per cent of the 22.26 miles driven to May 1 had required supports. Steel has been used to some extent in place of timbering. An advantage of steel is that the smaller dimensions of steel columns and arch beams as compared with timber plumb posts and segments

decrease the size of tunnel, giving smaller quantities of muck to be handled and concrete lining to be placed. The danger of fire (always present in dry tunnels) is much less with the steel lining. A feature of the steel is that tunnel men accustomed to wood timbering lack faith in the steel columns because of their smaller dimensions and are inclined to use unnecessarily heavy steel members.

Use of steel shapes and plates for holding up loose formations has been generally successful. For the most part the columns have been in three sizes: 4-in. H-sections of 13 lb. per ft., or 6-in. H-sections of 15½ and 20 lb. per ft. The wall beams are 6-in. H-sections of 20 lb. per ft., and are used in lengths of 5, 8, 10 and 20 ft. The plate sizes are 16x37 1/8 in., corrugated, mostly ¼ in. thick, although some ⅜-in. thickness has been used.

In gravel and soft-rock formations it has been the custom to put the steel right up to the face, using timber blocking to hold it in place. The blasting has done very little damage to the steel support.

In spite of the advantages of steel liner plates, recent advance in their cost has made this type of lining practically prohibitive except in such special cases as the gravel tunnels at Whitewater.

The district has recently completed experiments in the use of steel ribs and timber lagging, and as a result of these tests it has purchased a quantity sufficient to support about 6 miles of tunnel. These ribs are made of 6-in., 12.25-lb. I-beams in two pieces extending from invert to crown, where they are bolted together in a butt joint welded at right angles to the end of each section of rib. The ribs are spaced with ¾-in. tierods and 4x6-in. timber spreaders spaced as closely together as blasting or other conditions may require. The tierods and spreaders are removed after the heading has advanced about 200 ft. The spacing of the ribs may be anything from 6 in. to 6 ft., depending on the ground to be supported. It has also been found advantageous to double the beams where heavy ground requires the use of a considerable number of crown bars.

The cost of this combination support has been found to compare very favorably with all-timber support and considerably below that of all-steel. It has the advantages over timber of being a lesser fire hazard, less liable to sudden collapse and better for the insertion of additional sets where ground shows subsequent weight. In such cases the steel will also form a reinforcement for the concrete lining.

It is the general practice to backfill back of the timber lagging in the roof of the tunnel with timber, although this is not placed solidly. On the side walls the clean-up from the tunnel bottom is usually shoveled back of the lagging. No decision has yet been reached as to whether it will be necessary to grout the roof of the tunnel or fill it with sand or other material, but it is probable that no filling by grouting or other means will be done.

Frank E. Weymouth is general manager and chief engineer of the Metropolitan Water District. J. L. Burkholder is assistant general manager, and Julian Hinds is assistant chief engineer. James Munn is general superintendent of construction, and J. B. Bond is construction engineer, with headquarters at Banning. Division engineers are R. C. Booth, Division 1; John Stearns, Divisions 2 and 3; R. B. Diemer, Division 4; and B. C. Leadbetter, Divisions 5 and 6.

Interpretation of Codes in Federal Construction

Review and explanation of executive orders affecting interpretation of codes of fair competition as affecting bidders for federal construction

By Howard L. Jones
Cherrydale, Va.

THE FOLLOWING ARTICLE is the third of several, the first of which was published in *Engineering News-Record*, March 15, 1934, p. 360, and the second, May 14, 1934, p. 766, which will discuss various aspects of contractual practices and policies in federal construction. Contractors can regard these articles as being penned with the knowledge that lends almost official authority to the statements contained in them. With numerous federal public works now in progress and to be placed under contract, these reliable interpretations of official decisions and procedure by federal contracting agencies have great practical usefulness. —EDITOR.

THERE WAS APPROVED March 2, 1861, a law (now section 3709, Revised Statutes) which was designed to give all concerns an equal opportunity to compete for government business, to secure to the government the benefits that flow from competition and to prevent favoritism, collusion and fraud in procuring supplies and letting contracts. This act requires advertising in advance of making purchases and the acceptance of the lowest bid. It has been rigidly enforced by the accounting officers and the courts.

The codes of fair competition, adopted under the National Industrial Recovery Act, had for their purpose the standardization of prices and the elimination of cut-throat competition. Soon after the adoption of codes it was found that requests for bids on government business brought identical bids from every bidder. The codes were nullifying the purposes of the law of competition. The awards in some cases were made by drawing. The lucky bidder was the successful bidder or, to state it differently, the successful bidder was the lucky bidder. At any rate, the bidder who was favored by chance was the bidder who got the business. The law, on the one hand, required that there must be bidding and competition for government business, while on the other hand the codes prohibited cutting prices. The result was that on commodities affected by codes there was no competition.

First executive order

The President issued an executive order under date of Aug. 10, 1933, in which it was provided that all government contractors "shall comply with all provisions of the applicable approved code of fair competition for the trade or industry or subdivision thereof concerned, or, if there be no code of fair competition * * * then with the provisions of the President's Re-employment Agreement * * * without regard to whether the contractor is himself a party to such code or agreement."

This was taken by many to mean that only those who had signed a code or the President's agreement could bid for government business, or that if other than such signers did bid their bids could not be considered. The Administrator of Public Works issued Bulletin No. 51, section 53 of which provided that "No bid will be considered unless the bidder states affirmatively * * * that he has signed and is complying with the applicable approved code of fair competition * * * or if there be no such approved code * * * that he has signed and is complying with the provisions of the President's Re-employment Agreement."

It will be noted that the President's order stated only that there should be compliance with codes in the performance of government contracts, without regard to whether he was a party to such codes, while the bulletin issued by the Administrator made the signing of a code or the agreement a condition precedent to the bidding and contracting.

The Comptroller-General of the United States held, in 13 Comp. Gen. 65, that "The quoted terms of the executive order of Aug. 10, 1933, do not re-

quire that a bidder or contractor with the United States for the delivery of supplies shall be a 'member of the NRA' * * * but the requirement is that every contract for supplies shall contain a stipulation that the contractor shall comply with the applicable code of fair competition * * * and if no such code, then with the President's Re-employment Agreement 'without regard to whether the contractor is himself a party to such code or agreement.'" The clause of the executive order last quoted in the decision above clearly indicated that the contractor was not required to be a party to the code or agreement, but that he must comply with such agreements in executing the contract. The compliance referred to in the order of Aug. 10, 1933, seemed to pertain primarily to hours of labor and rates of pay.

The next question was whether bids submitted for government business, at prices less than those fixed in codes of fair competition, could be considered in awarding contracts.

The Comptroller-General of the United States held, in 13 Comp. Gen. 127, that "The provisions of those codes approved by the President pursuant to statutory authority have the force and effect of law. Hence, the rules governing the construction of statutes are for application in construing such provisions. Therefore, under the well-established rule that general words in a statute do not include the government * * * the codes * * * would appear to have no application to sales to the federal government." In 13 Comp. Gen. 159 it was held that "The bid as made is the responsibility of the bidder" and that there was no authority to reject a low bid "because of any assumption or administrative determination that the price quoted by the low bidder was so low that it violated a code."

Second executive order

It appears, however, that the administration had not fully expressed its intention in the order of Aug. 10, 1933. On March 14, 1934, the President issued an executive order clearly requiring compliance with codes as a condition precedent to bidding as follows: "1 (a) All invitations to bidders hereafter promulgated * * * shall contain a provision to the effect that no bid will be considered unless it includes or is accompanied by a certificate duly executed by the bidder stating that the bidder is complying with and will continue to comply with each approved code of fair competition to which he is subject" or "with an agreement with the President under section 4 (a) of the National Industrial Recovery Act." The matter was still further definitely settled in the following paragraph: "(b) No bid which does not comply with the foregoing requirements shall be considered or accepted."

In a decision of April 2, 1934, the Comptroller-General of the United States held that "The administrative responsibility in contracting on behalf of the United States is limited to seeing that the advertised specifications contain the requirement stated in sub-paragraph 1 (a) of the Executive Order." When the bid is accompanied by the required certificate of compliance and there is incorporated in the contract a provision that the contractor shall comply with approved codes, it is held to be no part of the contacting officer's "authority or responsibility to determine whether a bid as made contravenes any code." It is further said to be "his duty to accept the low responsible bid containing or accompanied by the required certificate."

It would now seem settled that a bid for government business cannot be considered unless it is accompanied by a certificate that the bidder is complying with the applicable codes or the President's Re-employment Agreement. The responsibility for determining that there is actual compliance in the performance of the contract would seem to rest in the hands of the National Recovery Administration.

In a recent decision it was held that contracts with the United States must be performed in accordance with their terms and that there is no legal authority that would authorize or justify the revising upward of the contract price to conform to a code.

The following is the form of certificate being required by the procurement division of the Treasury Department. A similar certificate will undoubtedly be required in bidding and contracting for construction projects.

"It is hereby certified that the undersigned is complying with and will continue to comply with each approved code of fair competition to which he is subject, and/or if engaged in any trade or industry for which there is no approved code of fair competition, then as to such trade or industry that he has become a party to and is complying with and will continue to comply with an agreement with the President under Section 4 (a) of the National Industrial Recovery Act (President's Re-employment Agreement), and that all other conditions and requirements of Executive Order No. 6646, dated March 14, 1934, are being and will be complied with."

An order issued by the Administrator for Industrial Recovery on April 11, 1934, provides that no certificate of compliance is necessary in the case of emergency purchases of less than $50 and other emergency purchases "when, in the opinion of the purchasing officer, it is not possible or practicable to obtain the certificate." This order also exempted leases for the rental of land for any purposes "where no services are rendered to the government by the government by the lessor" and "all leases involving annual rental at a rate not exceeding $500 per annum."

It has been held as to contracts entered into prior to March 14, 1934, date of the executive order, that "Such certificate need not be furnished." The decision held that the order "is clearly prospective and not retroactive in its operation." There has arisen the question of whether the fixing of prices under or in a code of fair competition is in violation of the anti-trust laws. There has been no decision in the matter.

Stream-Gaging Research in Iowa

COOPERATIVE stream-gaging in Iowa, carried on from 1917 to 1927, and then discontinued largely because of lack of financial support, was re-established in 1932. The water resources branch, U. S. Geological Survey, assigned R. G. Kasel as district engineer for the state, locating him at the Institute of Hydraulic Research, an integral part of the college of engineering, University of Iowa. In a progress report for the period since work was resumed by Mr. Kasel and F. T. Mavis, associate director of the Institute of Hydraulic Research, there is given a list of 32 existing gaging stations on nine major watersheds—including the Des Moines, Skunk, Iowa, Cedar, Wapsipinicon, Maquoketa, Turkey, Upper Iowa and Little Sioux rivers. Artificial controls and cableways are being constructed to increase the accuracy of gaging low flows, since some former records have been in error several hundred per cent. Compilations are being made of available data on rainfall and surface-water supplies, so valuable to engineers planning and designing water supply, sewage disposal, water power, navigation, flood control and conservation. Some of this information is published in Water Supply Paper 732, 1932. Existing data on precipitation intensity and frequency, water losses, flood discharge and frequency, statistics of 50 hydro-electric power plants and a brief description of all streams except the smallest creeks, are being brought together for publication. Contributions to the work either in cash or services are being made by the Iowa Institute of Hydraulic Research, State Board of Conservation, State Fish and Game Commission, Mississippi River Power Co., Interstate Power Co., Iowa Electric Co., Des Moines Waterworks Commission, Iowa State College, Boone Water Dept. and Decker Packing Co. The PWA allotted $21,500 to carry the work until the end of this year.

The Federal Program for Subsistence Homesteads

About 40 projects established and $10,000,000 allotted to provide modern houses and small acreage where subsidence agriculture can be combined with part-time or seasonal industrial employment

Special Correspondence

THE ADMINISTRATION'S subsistence - homesteads program, financed by a $25,000,000 appropriation, has already initiated about 40 projects distributed over 20 states and made allotments totaling $10,000,000. The remainder has been tentatively allocated either to specific projects or to areas within which it has been decided to locate. There is no lack of applicants supporting additional development plans. At present such proposals aggregate $4,500,000,000. Careful investigation is required in the consideration of each project because of the speculative urge that may be its inspiration. The original plan to put the management of projects in the hands of local corporations subsidiary to the Federal Subsistence Homesteads Corp. in Washington was soon discarded in favor of direct control.

Modern communities will be built with tracts of land (1 to 30 acres) surrounding small houses. This will enable families that have been stranded by declining industries or marooned on submarginal agricultural land to become self-supporting again by combining subsistence agriculture with part-time or seasonal work in near-by industries. The repayment plan for the purchase of these modern homesteads, with costs ranging from $2,000 to $3,300, is liberal with interest at 4 to 5 per cent and a 20-year period.

Location of the projects has involved study of many conflicting factors. Original ideas that these "federal laboratories" should initiate relief from the recognized defects inherent in areas of metropolitan concentration by establishing groups near small towns have been modified. The danger that this type of community would soon develop into the mill-village type was one factor, combined with the realization that the mere providing of labor is not sufficient inducement to promote branch-industrial development in localities remote from raw materials and transportation. As a result, practically all the subsistence-homestead projects for white-collar and industrial workers will be located close to metropolitan areas where it will be possible for the homesteaders to secure at least part-time work in established industries. The problem of stranded populations in remote localities is a special case, with present official indications pointing to the advisability of giving them local assistance rather than attempting to move them.

Used for relief

Several states and cities, at the suggestion of Administrator Hopkins, are now adopting the subsistence-homestead plan as a form of local relief. Federal funds allotted to the states for relief purposes are being used in carrying out this work. This general plan extends the principle of work relief to include employment for wages of destitute families in the building of their own homes and, later on, for other work to supply them with needed equipment and cash. For example, it is claimed that Cleveland's program for the establishment of a rural community will cut its $20,000,000 relief load in half.

Eventually such communities are expected to develop their own handicraft and industrial enterprises, but at present the subsistence-homesteads program has been subordinated to the relief idea, and the extent to which it may become a factor in the redistribution of urban or rural population cannot be predicted.

Not self-supporting

Residents of subsistence homesteads cannot live exclusively on the fruits and vegetables they produce. Therefore it is essential that some form of industrial or commercial employment be available within a convenient distance. This, in turn, requires the spread of industrial activity into new communities if these homestead projects are to be located near small towns or in rural areas. Assuming that the inhabitants of the homestead project would provide suitable labor in quantity and quality, there are question of raw materials, access to market, capital required and other factors that tend to restrict the spread of industrial activity outside metropolitan areas.

For this reason the officials of the subsistence-homestead division have apparently modified the original plan to transplant industry to the countryside. One exception is the Hightstown project in New Jersey where the government will loan $500,000 to provide homesteads for 200 New York City families located near a new factory built in conjunction with the federal-aid community.

From the outset it has been the purpose of the officials to escape the building of mere company towns, or communities dominated by a single industry. The object has been not only to divorce the subsistence homestead from the inherent evils of the mill village but also to give these people a choice of jobs, or, in the language of the planners, provide more than one defense against unemployment. Obviously this plan cannot be correlated with the establishing of communities near small towns because of the single type of industrial development usually available.

For this reason, and to accomplish the best practical results, the trend in subsistence-homestead planning now is toward locating them near large cities where a greater spread of employment is possible. Projects falling in this category include those at Birmingham, Ala., Los Angeles, Calif., Wilmington, Del., Duluth, Minn., Rochester, N. Y., and Youngstown, Ohio. To permit community planning and reduce costs by consolidation, most of the projects

Wide World Photo

FIFTY HOMESTEADS formed the initial unit of the Reedsville subsistence project near Elkins, W. Va., which will be developed into 125 such homes. Construction was started about ten months ago.

so far undertaken are located on a single tract of land, although the Youngstown project is intended to demonstrate the feasibility of building scattered homesteads throughout the environs of any large industrial center.

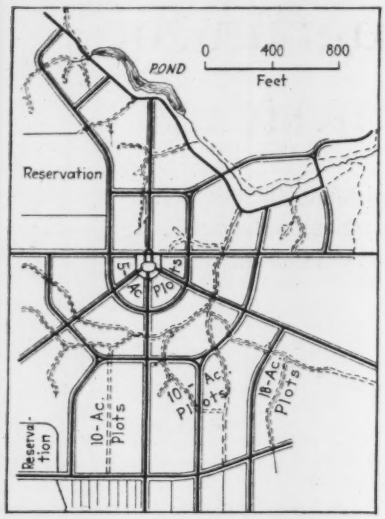
Submarginal lands

The original program included relief to farmers located on worn-out land. This would not only serve to rehabilitate submarginal rural population but would also prevent the move of this population to cities, which would tend to offset the decentralization sought by other phases of the subsistence-homesteads program. A rural project is under way in Jasper and Putnam Counties, Ga., to place on fertile plantation land some 500 families who are now scattered over waste land of the lower Piedmont. In such cases the homesteaders must be able to produce and dispose of a cash crop and become self-supporting. This tends to conflict with the other principle that the homesteader will not compete with the commercial farmer; but it is justified, according to the subsistence homesteads division, by the retirement from cultivation of submarginal land from which the homesteaders were moved. This logically carries rural projects into forestation and other land-conservation measures, and reservations in Georgia, northern Wisconsin, the Tygart River valley of West Virginia, Richton, Miss., and elsewhere will provide homesteaders with seasonal employment. To work of this character there is no limit, but the cost devolves almost entirely on federal and state governments.

Management plan

For the supervision of each project a manager is appointed, usually from the same state in which the project is located. Ideal qualifications for a manager include a combination of executive, construction superintendent, truck farmer and general monitor of human relations. The manager's staff includes a purchasing agent, auditor and such assistants as may be necessary according to the size of the project, which may range from a group of 25 to a community of 400 homes.

When the project has been located and the tract procured by the federal corporation, the local manager advertises for bids on plans drawn by a local architect, which have been approved by the division in Washington. The type of building varies with the location, and construction may be of lumber, brick or stone, depending upon the local source of supply. Contract is awarded to the lowest bidder. In Texas, Mississippi, Alabama and California, where several projects are located in the same state, operations are carried out on a statewide basis. The division also has a few regional representatives to supervise any necessary coordination.



PROJECT LAYOUT at Penderlea Homesteads, Pender County, N. C., showing the planned community with 5-acre plots near the center, where industrial activity will provide some work and larger 10 and 20-acre plots at the outskirts for more extensive agriculture.

Preliminary selection of the families to occupy the project is made by the project manager with the assistance of sponsoring organizations, civic groups and agricultural college officials. A proposed list is submitted to the division in Washington for the purpose of final selection. The purchase contracts permit amortization over a 20-year period, with interest at 4 or 5 per cent, depending upon the method of collecting for administrative expense. No cash, unless possibly the first payment, is required in most cases.

The unit cost ranges from $2,000 to $3,300, including purchase of 1 to 30 acres of land.

Specific example

As an example of the arrangement and work being undertaken at one of these subsistence-homestead projects, there follows a brief outline of the Penderlea subsistence homestead project located in southeastern North Carolina. The general arrangement is indicated in the accompanying drawing. This is a typical rural project planned by the division and will include 313 units ranging from 5 to 20 acres in area located on a tract of approximately 3,300 acres. The unusually large size of the individual homestead unit results from the fact that it is to be occupied by farmers from various submarginal regions whose farms will be taken out of production. Careful attention has been given to the study of topography, existing improvements and the economic plan for developing the community.

The tract selected has only minor variations in elevation, but the existence of certain swamp areas and small streams dictated the general layout. The land along the northern edge of the tract contains a stream and a wooded strip of land. When properly drained, this area will provide recreational features for members of the community. This system of streams also influenced the placing of homesteads to give proper drainage.

Because most of the area was wooded, the final plan provided for leaving a 100-ft. belt of trees on either side of the road to provide shade and necessary wind breaks. The reservations noted on the illustration are tracts of low land that are to be drained and then made available for additional homesteads.

The existing county road that crossed the tract is being supplemented by a second, and the community center is to be established at the junction of these two roads. This will be the location of the school, shops and other community buildings. Other roads will be laid out to serve the tract in the interests of economy and accessibility.

The smaller homesteads of 5 acres or less, which will be occupied by persons having some outside employment and means of cash income, are being established close to the community center where this employment will be offered. The larger homesteads occupy the area farther from the center of the community and are laid out in such a manner that some of the 5-acre units can be combined into 10- or 20-acre homesteads, if advisable.

The Penderlea project plan was laid out under the direction of John Nolan, town planner, Cambridge, Mass., consultant to the division of subsistence homesteads.

River Surveys About Completed

The comprehensive surveys of the more important river systems of the country being made to provide basic information for the development of these streams, as called for in House Document 308, have been practically completed, according to an announcement of Major General E. M. Markham, chief of engineers. These surveys have been made on 199 rivers, and of these investigations 165 have been completed and the resulting reports rendered to Congress. Of the remainder, 22 reports are now under final review by the Board of Engineers for Rivers and Harbors, and twelve are still in the hands of the district engineers in charge of the direct investigation, although all field data have been assembled for these last reports. It is estimated that the reports will represent an expenditure of about $11,000,000, and General Markham has expressed the opinion that the information resulting from these surveys will enable coordinated programming of water development on these streams which will effect savings exceeding the cost of the surveys by many times.

Seawall for State Beach at Hampton, N. H.

Cove-section concrete seawall about 4,000 ft. long, with cyclopean rock apron and seven rock groins, starts state beach development on New Hampshire ocean coast

HAMPTON BEACH on the short ocean coast line of New Hampshire is outstanding as the location of one of the few active beach-protection operations being carried on by Atlantic coast states. A seawall 14 ft. high and 3,815 ft. long, parallel to the beach with the ends turned inshore respectively 30 and 50 ft., is the first improvement unit now under construction. It calls for nearly 10,000 cu.yd. of reinforced concrete, and the 18-ft. toe paving, or apron, on the seaward side and seven seaward groins will require 20,000 tons of rock. Including the inshore gravel walk, concrete curb and other appurtenances illustrated, the contract price was $219,673.80. The money is provided by a PWA 30 per cent grant and state funds. Construction is by contract with Warren Brothers Roads Co., Cambridge, Mass., under the engineering direction of the state of New Hampshire highway department.

Ocean Road, the state highway south from Portsmouth, N. H., closely parallels the sea beach to the Massachusetts line. Following the heavy coast gales of two years ago, this road and the bordering beach property were damaged. As a result, action that had been urged for a long time was pressed, and an enabling act by the state legislature in 1933 secured Hampton Beach to the state from the open ocean to the west line of Ocean Road and placed its improvement and management under the administration of the New Hampshire highway department. The new seawall is therefore in part a road protection as well as a beach-development undertaking. As they are now in formation, the plans contemplate many other improvements. Present activity is, however, confined to the seawall.

Wall design and structure

The line of the wall is in general about 250 ft. inshore from the mean low-water contour, which is zero datum. For about 770 ft. at the north end it has a curve, concave toward the ocean, of 1,500-ft. radius and then flattens out to a gentle curve of 20,000-ft. radius to the south end. On the line of the wall the present surface of the beach is from 14 to 15 ft. above datum for the major length of the wall; at about stations 600 to 1,000 from the north end there is a summit from 1 to 3 ft. higher, and again at about station 3,400 the surface rises to about El. 20 and continues at that height. With the footing at El. 8 the total excavation is nearly 26,000 cu.yd. The top of the wall is at El. 22.

The wall is founded on coarse sand brought in by the sea and covering an old marshland. Under the covering is a layer of silt, silt-peat and silt-sand of irregular depth but all over hard material—sand, gravel or clay. At one point there is a summit in the silt layer rising about 2½ ft. above datum, but generally the surface is from 1 to 10 ft. below datum, giving, except at the one high spot, from 9 to 18 ft. of firm material between the wall footing at El. 8 and the top of the silt layer. With the removal of the existing sand load by 6 to 12 ft. of excavation, this thickness of firm material over the silt was considered adequate to carry the wall.

As shown by the drawings of Fig. 2, the wall foundation is a heavily reinforced concrete slab 10 ft. wide and 1 ft. thick resting directly on the sand left undisturbed by excavation. A 24x8-in. tongue or tenon on the footing, with two rows of dowels as shown, locks the footing and wall. The wall is monolithic above the footing in 30-ft. sections separated by tongue-and-groove expansion joints with a bituminous filler. In section the wall is of the gravity type with a cove face on the ocean side to turn back the wash of the surf and reduce the impact. On the land side the wall is compactly backfilled to within about 4 ft. of the top, and on the ocean side it is buttressed to a height of 5 ft. by a continuous apron of heavy rocks. Both backfill and apron load the footing ledges projecting beyond the base of the wall.

The inshore returns of the wall at the ends are simple gravity sections. To give access to the beach, the main wall is provided with eight right and left stairways designed as shown by Fig. 3 to shut out wave wash through the necessary openings in the wall. An 8-ft. opening in the wall gives access to a landing with right and left stairs. In front of the landing and stairs is a guard-wall rising from a widening for this purpose of the main wall footing and completely shielding the opening in the main wall. The stone apron is continuous in front of the guard-wall. Other essential details are clear from the drawings. The main feature of the design, however, is that wave wash to reach the stairway opening in the main wall must pass around the ends of the guard-wall and mount the stairs.

FIG. 1—SEAWALL of reinforced concrete under construction by New Hampshire highway department to protect state road and shore property at Hampton, N. H.

Apron and groins

Dependence against wave scour under the wall is placed on the heavy stone apron, Fig. 2. This is a paving of large rock slabs not cast into place but derrick-laid like masonry with reasonably close joints chinked with smaller stone. Particularly the top layer is planned to give a roughly smooth pavement down to the beach sand, both for the comfort of those using the beach and to reduce turbulence and suction scour as the wash travels along and over the apron.

As specified, the apron stone will be quarry slabs from 18 to 27 in. thick and will weigh from 2 to 5 tons and average not less than 2½ tons. They are to be laid with selection of shape to insure a

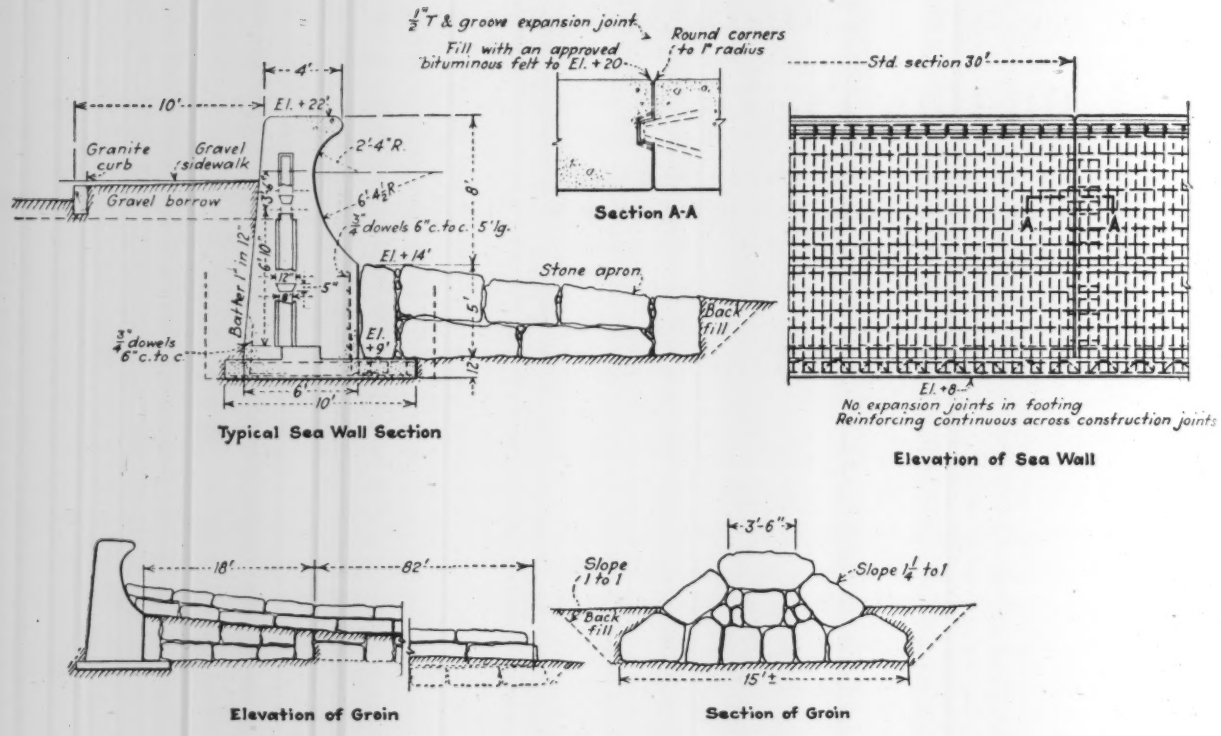


FIG. 2—SEAWALL at Hampton, N. H., with rock apron and groins to prevent beach erosion and check sand drift.

tight and compact masonry mass. At the foot of the stairways a special apron construction is required for landing areas, as shown by Fig. 3. Here selected stone is to be laid like flagging, and the joints are to be grouted.

As a guard against sand drift and scour of the upper beach, stone groins extending out about 100 ft. normal to the wall and spaced from 420 to 480 ft. apart are being built as shown by Fig. 2. Here again stone work is constructed in section, the groin is a triangle of placed stones inclosing a core of smaller irregular stones. As specified, "stones encasing the core, exclusive of capstones, shall weigh from 2 to 5 tons. The capstones shall be of sufficient length to extend for the full width of the top of the groin and shall weigh not less than 4 tons."

The main construction items involved in the work as contracted were 12,190 cu.yd. of emplacement excavation for

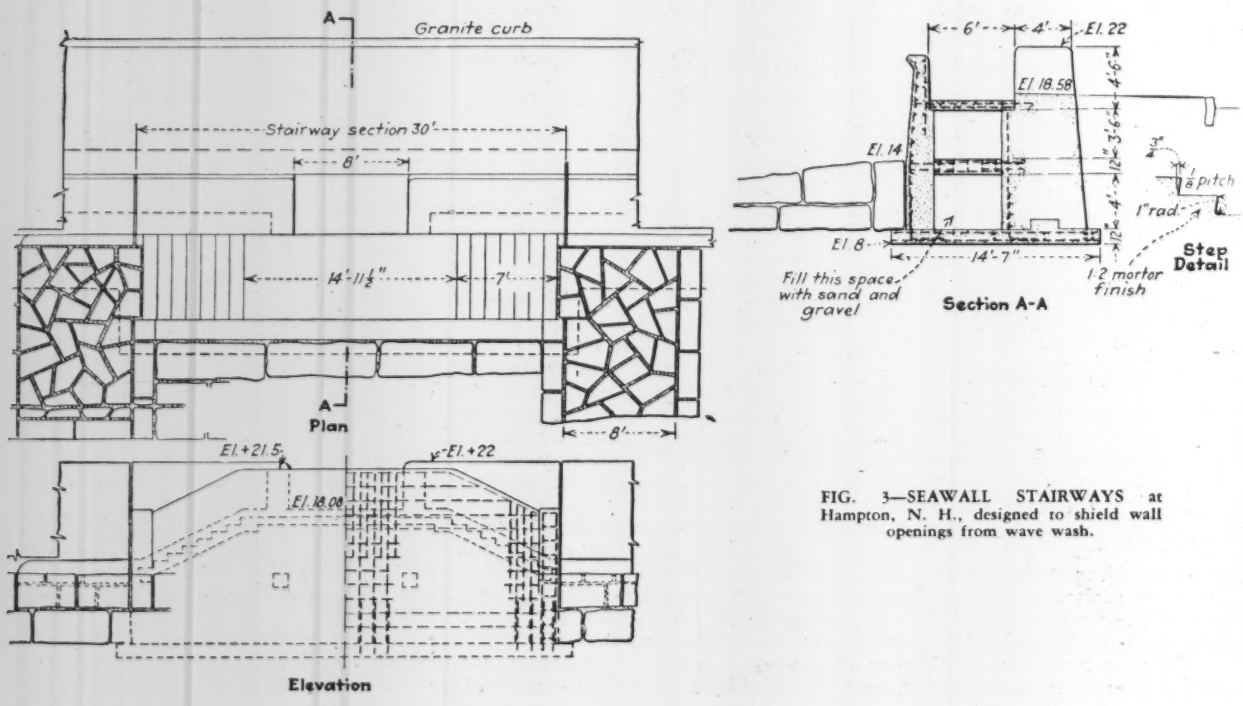


FIG. 3—SEAWALL STAIRWAYS at Hampton, N. H., designed to shield wall openings from wave wash.

wall, apron and groins, 4,450 cu.yd. of gravel borrow for the upper part of the backfill on the land side (Fig. 2), 1,673 cu.yd. of footing and 8,261 cu.yd. of wall concrete, 716,700 lb. of reinforcing steel, 20,000 tons of apron and groin rock, and 13,650 cu.yd. of general excavation. All contract provisions are according to the requirements of PWA regulations.

Excavation was a straightforward dragline operation. Surplus material not required for backfill was disposed so that the tides will level it down to form beach area. Backfill is required to be deposited in layers, and the final cut for the wall foundation is to be so made that the natural condition of the soil on which the footing concrete is deposited will not be disturbed.

Broadly defined, a 1:2:4 concrete is being used for the footing and a 1:2:3½ concrete for the wall. As specified, the concrete is to be proportioned as follows:

Item	Wall	Footing
Min. strength, lb. per sq.in.	2,500	2,000
Min. cem. factor, bbl. per yd.	1.50	1.25
Max. water, gal. per bag	6	6½
Slump, in.	3-5	3-5

Mixing and placing methods and form construction are according to common practice for first-class concrete work.

As shown by Fig. 1, the contractor is building the wall in alternate 30-ft. sections, using single-panel wood forms for front and rear faces. The footing is carried ahead continuously far enough to have strength to carry the construction loads. The mixer travels along the land side of the wall and discharges to a portable belt conveyor reaching to the top of the forms and feeding into a chute.

As stated, the beach improvement is being carried out under the design and supervision of the New Hampshire state highway department, of which F. E. Everett is commissioner and Daniel H. Dickinson chief engineer.

Historic Bridge Saved by Metal Crib Wall

Retaining wall of standard units installed during winter months to protect pier of 220-ft.-span wooden bridge near Eugene, Ind.

By Chas. Ferguson
Road Supervisor, Vermillion County, Ind.

ONE OF THE FINEST of the old wood bridges still remaining in Indiana is the 220-ft. span which carries traffic over the Vermillion River, a short distance from Eugene, Ind. When built in 1873, this bridge, which is still in service and in a remarkable state of preservation, consisted of the main span of 220 ft. and a short approach span on the south side of the river. At that time the main flow in the stream was concentrated in the central and northern portions of the streambed. In the intervening years the approach span has been removed and replaced by an earthfill, leaving the south end of the bridge resting on a pier without wing walls to protect it or the fill. A change in channel has been gradually cutting away the south bank of the stream and exposing the pier.

During the high water of 1933 the water came up within 3 ft. of the floor of the old bridge. The earthfill, composed of a sandy soil, started to give way. County road forces were rushed to the scene, the countryside was scoured for sandbags, and after an all night battle the gap was stopped and the old bridge saved. Nothing was done until the early months of this winter toward permanent protection. Then the inauguration of the CWA program gave an excellent opportunity to construct the necessary protection.

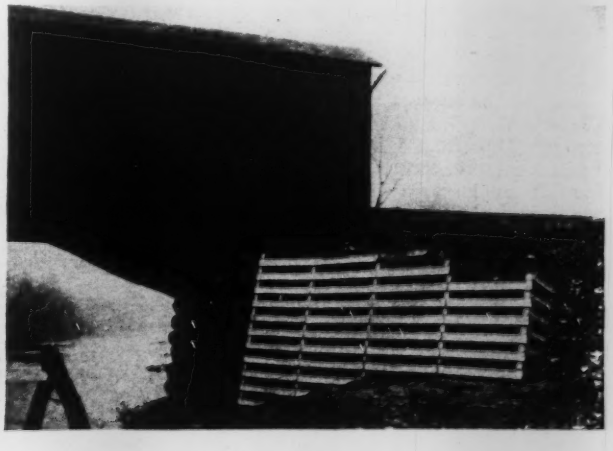
The time of the year and the need for speed, once the necessary excavation was completed, together with the fact that un-skilled labor was to be used, presented a problem. After a careful consideration of different types of construction, the county officials chose a metal-crib retaining wall as best suited to meet the conditions. Using standard metal cribbing units, a wall was constructed 24 ft. high immediately adjacent to the pier and stepping to a height of 12 ft., where it intersected the bank.

As soon as excavation was carried down to rock on a level with the foot of the pier, assembly of the cribbing units was started on the two tiers of bins adjacent to the pier. Excavation for other portions of the wall was carried on simultaneously with the erection of the first cribs, allowing the excavated material to be used in backfilling the cribs already in place. To prevent washing of the backfill, the front of the cribs was backfilled with rock. Starting the final excavation on Thursday, with two six-hour shifts, six men to a shift, erection and backfill of all but the upper 7 ft. of the wall were completed by noon of the following Saturday. Work was resumed the following Tuesday morning and was completed during the extremely cold wave that prevailed at that time.

The officials directly interested in carrying out this improvement were the writer and the board of commissioners, composed of D. M. Hanna, Robert Carlin and Reuben Fortner.

OLD WOOD BRIDGE, with a clear span of 220 ft., and the metal crib wall that protects it from high waters.

A CLOSE-UP of the completed wall, showing the rockfaced fill to prevent washing of the earth backfill.



Checking Moment Computations for Rigid Frames

Values obtained by Cross method of moment distribution verified by determining joint rotations by two independent formulas, also by using one of the formulas to check angular rotations of the columns

By A. S. Niles, R. L. Vernier and W. A. Campbell

Respectively, Professor of Aeronautic Engineering, and Graduate Students, Stanford University

AN OBSTACLE to the more extensive use of the Hardy Cross method of moment distribution in the analysis of continuous beams and rigid frames has been the lack of a simple method of checking the accuracy of the computed moments. Even though arithmetical or other errors are made, the Cross method is such that the summation of moments about any joint will equal zero after the moment distribution is completed. Any error, such as improperly proportioning the balancing moments about a joint, or a mistake in carrying over from a balanced joint to the opposite ends of the members entering the joint, will cause the final moments to be incorrect, even though $\Sigma M = 0$ at every joint.

To minimize this difficulty, a method enabling the engineer to check his moment-distribution computations rapidly and independently has been devised. It consists of the substitution of the calculated end moments in formulas involving values of joint rotation θ, rotations of the members R, and the moments, and solving for the same θ's and R's from two or more independent equations. The values obtained are then compared, and the closeness of agreement indicates the accuracy of the moments.

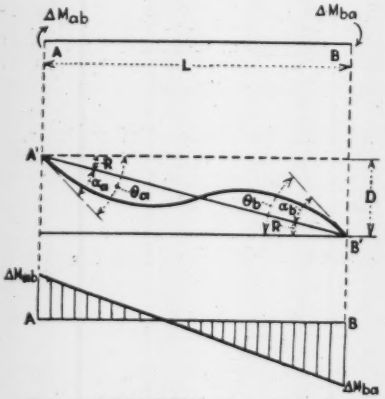


FIG. 1—ROTATIONS of a simple beam acted upon by bending moments as shown.

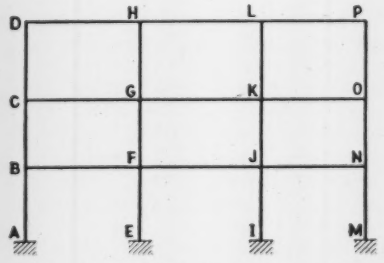


FIG. 2—TYPICAL building frame in which lower ends of all columns are fixed.

Formula derivation

The formulas used are derived from the moment-area theorems. One of these formulas may also be used in the computation of side deflections of rigid frames from the results of the moment-distribution computations.

Imagine the ends of the simple beam AB (Fig. 1) acted upon by the bending moments ΔM_{ab} and ΔM_{ba}, which cause angular rotations of the end tangents equal to α_a and α_b. Further assume that supports A and B are moved to A' and B', thus inducing an angular shift in the axis of the beam $= D/L = R$. Then the total rotation of the tangent at a is $\theta_a = \alpha_a + R$. The angular rotations, α, may be evaluated in terms of the end moments by any of the standard methods of beam analysis. Since the angular rotations at the ends of a simple beam are numerically equal to the corresponding end shears in the conjugate beam when the latter is loaded with the M/EI diagram, we obtain (considering clockwise rotation and clockwise moment on the beam as positive):

$$\alpha_a = \frac{L}{6EI}(2\,\Delta M_{ab} - \Delta M_{ba})$$

$$\alpha_b = \frac{L}{6EI}(2\,\Delta M_{ba} - \Delta M_{ab})$$

but $\alpha + R = \theta$;

$$\text{whence, } \theta_a = \frac{2\,\Delta M_{ab} - \Delta M_{ba}}{6EK} + R$$

$$\theta_b = \frac{2\,\Delta M_{ba} - \Delta M_{ab}}{6EK} + R$$

where $K = I/L$

The equations given are derived for the case where there is no side load applied between the ends of the member. If, when side loads were applied, they were accompanied by end moments, MF, of the proper magnitudes, they would produce no tendency to rotate the ends of the member, and the above equations would still hold. In this latter case, however, though the values of θ and R would still represent the total rotations of the member as a whole and its ends, the values of ΔM would be the differences between the total end moments and the fixed-end moments required for the given side loads. Thus, if the total end moments are represented by M_{ab} and M_{ba},

$$\Delta M_{ab} = M_{ab} - MF_{ab}$$
$$\Delta M_{ba} = M_{ba} - MF_{ba}$$

As the values of the proper fixed end moments MF must be calculated in order to carry out the moment-distribution computations, the determination of the values of ΔM is a simple matter.

The equations for θ_a and θ_b are of such character that we may write as a single general formula for the rotation of a joint

$$\theta_a = \frac{2\,\Delta M_{ab} - \Delta M_{ba}}{6EK} + R \qquad (I)$$

where θ_a is the desired joint rotation.

ΔM_{ab} is the total moment at the joint less the corresponding fixed-end moment for any member entering the joint.

ΔM_{ba} is the corresponding quantity for the far end of the same member.

R is the angular rotation of the member as a whole.

E is the modulus of elasticity.

$K = I/L$ is the stiffness factor of the member.

If the building frame of Fig. 2 were subjected to any given loading, the end moments on the various members could be computed by the method of moment distribution. Since the R values for all the horizontal members would be equal

TABLE I—COMPUTATION OF θ'S FROM END MOMENTS OF HORIZONTAL MEMBERS

FORMULA I — $6E\theta_a = \dfrac{2M_{ab} - M_{ba}}{K}$

Floor	Span	$2M_{ab}$	M_{ba}	$2M_{ab} - M_{ba}$	K	$6E\theta_a$
1	AB	+576	+245	+331	30.5	+10.9
1	BA	+490	+258	+202	30.5	+ 6.65
1	BB′	+496	+248	+248	37.3	+ 6.65
2	AB	+406	+184	+222	21.4	+10.4
2	BA	+368	+203	+165	21.4	+ 7.73
2	BB′	+452	+226	+226	29.2	+ 7.74
3	AB	+374	+172	+202	21.4	+ 9.45
3	BA	+344	+187	+157	21.4	+ 7.34
3	BB′	+380	+190	+190	26.2	+ 7.25
4	AB	+340	+154	+186	19.5	+ 9.54
4	BA	+308	+170	+138	19.5	+ 7.07
4	BB′	+368	+184	+184	26.2	+ 7.03
5	AB	+336	+152	+184	19.5	+ 9.44
5	BA	+304	+168	+136	19.5	+ 6.97
5	BB′	+332	+166	+166	23.8	+ 6.97
6	AB	+270	+126	+144	14.1	+10.20
6	BA	+252	+135	+117	14.1	+ 8.30
6	BB′	+284	+142	+147	17.2	+ 8.26

TABLE 2 — COMPUTATION OF θ'S FROM END MOMENTS OF VERTICAL MEMBERS

FORMULA II — $2E\theta_a = \dfrac{M_{ab} - M_{ba}}{K} + 2E\theta_b$

COLUMN A

Story	M_{ab}	M_{ba}	$M_{ab} - M_{ba}$	K	$\frac{M_{ab} - M_{ba}}{K}$	$2E\theta_b$	$2E\theta_a$	$6E\theta_a$	$6E\theta_a$ from Table 1
B-1	—179	—272	+93	25.8	+3.60	0	+3.6	+10.8	10.9
1-2	—113	—108	— 5	35.6	— .14	+3.60	+3.46	+10.38	10.4
2-3	—100	— 91	— 9	35.4	— .254	+3.46	+3.21	+ 9.62	9.45
3-4	— 88	— 88	0	35.4	0	+3.21	+3.21	+ 9.62	9.54
4-5	— 85	— 83	— 2	29.4	— .068	+3.21	+3.14	+ 9.43	9.44
5-6	— 75	— 83	+ 8	29.4	+ .272	+3.14	+3.41	+10.23	10.20

COLUMN B

									BA	BB'
B-1	—251	—308	+57	25.8	+2.2	0	+2.21	+6.63	6.65	6.65
1-2	—227	—239	+12	35.6	+ .337	+2.21	+2.55	+7.64	+7.73	7.74
2-3	—188	—182	— 6	35.5	— .169	+2.55	+2.38	+7.14	7.34	7.25
3-4	—176	—174	— 2	35.5	— .056	+2.38	+2.32	+6.96	7.07	7.03
4-5	—162	—162	0	30.4	0	+2.32	+2.32	+6.96	6.97	6.97
5-6	—143	—156	+13	30.4	+ .427	+2.32	+2.75	+8.25	8.30	8.26

TABLE 3 — COMPUTATION OF R VALUES

FORMULA (Ia) — $6ER = \theta_a - \dfrac{2M_{ab} - M_{ba}}{K}$

COLUMN A

Story	M_{ab}	$2M_{ab}$	M_{ba}	$2M_{ab} - M_{ba}$	K	$\frac{2M_{ab} - M_{ba}}{K}$	$6E\theta_a$	$6ER$
B-1	—179	—338	—272	— 86	25.8	+3.33	+10.8	+14.1
1-2	—113	—226	—108	—118	35.6	+3.32	+10.4	+13.7
2-3	—100	—200	— 91	—109	35.4	+3.08	+ 9.53	+12.61
3-4	— 88	—176	— 88	— 88	35.4	+2.48	+ 9.58	+12.06
4-5	— 85	—170	— 83	— 87	29.4	+2.96	+ 9.43	+12.39
5-6	— 75	—150	— 83	— 67	29.4	+2.98	+10.21	+12.49

COLUMN B

Story	$2M_{ab}$	M_{ba}	$2M_{ab} - M_{ba}$	K	$\frac{2M_{ab} - M_{ba}}{K}$	$6E\theta_a$	$6ER$	$6ER$ from Column A
B-1	—616	—251	—365	25.8	—14.1	0	+14.1	+14.1
1-2	—478	—226	—252	35.6	— 7.08	+6.65	+13.7	+13.7
2-3	—364	—288	—176	35.5	— 4.96	+7.71	+12.7	+12.61
3-4	—396	—176	—170	35.5	— 4.79	+7.24	+12.0	+12.06
4-5	—324	—162	—162	30.4	— 5.33	+7.02	+12.4	+12.39
5-6	—317	—143	—169	30.4	— 5.56	+8.27	+13.8	+12.49

to zero, use of formula (I) makes it possible to write two independent expressions for the rotations of each of the joints on the interior columns. For any given joint these two expressions must be equal if the moment computations are correct. But only one expression can be written for the rotation of each joint on the exterior columns. Therefore it becomes necessary to derive another formula that will give a second independent expression for values of θ on the exterior columns.

Consider the beam AB in Fig. 1. The difference in slope at the ends of the beam is numerically equal to the area under the M/EI curve between the two points. That is

$$\alpha_a - \alpha_b = \frac{L}{2EI}(\Delta M_{ab} - \Delta M_{ba})$$

whence

$$\alpha_a = \frac{L}{2EI}(\Delta M_{ab} - \Delta M_{ba}) + \alpha_b.$$

Adding R to both sides,

$$\alpha_a + R = \frac{L}{2EI}(\Delta M_{ab} - \Delta M_{ba}) + \alpha_b + R,$$

but

$$\alpha + R = \theta$$

$$\therefore \theta_a = \frac{\Delta M_{ab} - \Delta M_{ba}}{2EK} + \theta_b \qquad \text{(II)}$$

As above, we may take this equation as a general formula for multi-membered bents.

Particular note should be taken of the fact that the ΔM values are not *actual* moments but are *changes* in moment found as explained above. Also, it will be noticed that the lower ends of the first-story columns of the frame shown in Fig. 2 are fixed (the usual case in nearly all building frames). That is, $\theta_a = \theta_c = \theta_i = \theta_m = 0$. This makes it possible to use formula (II) to obtain values of the rotations of the joints on the exterior columns which are independent of the values given by the use of formula (I). Therefore, if the values given by the two different formulas check one another, the moment computations are correct.

Another important check is obtained by the use of formula (I) rewritten as follows:

$$R = \theta_a - \frac{2\,\Delta M_{ab} - \Delta M_{ba}}{6E\,K} \qquad \text{(Ia)}$$

Since the changes in length of the floor beams are assumed equal to zero, the R values of all of the columns in each story must be the same, and formula (Ia) may be used to check and see that this is true.

Application of formulas

The procedure for checking the moment computations may be outlined as follows: Assume that the bending moments for a rigid frame similar to the one shown in Fig. 2, with as many bays and as many stories as desired, have been computed by the method of moment distribution. Then,

1. Use formula (I), remembering that $R = 0$ for all horizontal members, and calculate θ_b, θ_f, θ_j, etc. Proceed to the next story and calculate θ_c, θ_g, θ_k, etc., and so on up to the top.

2. Start with the first story columns, the lower ends of which are fixed, and

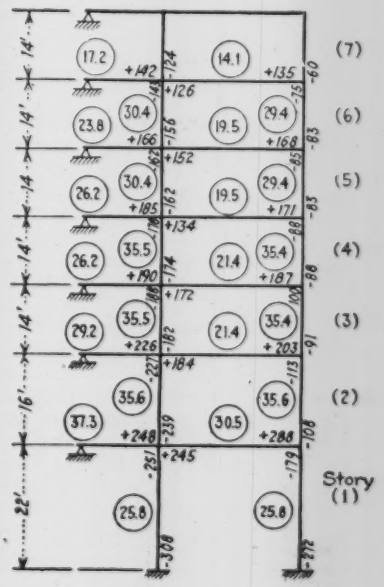


FIG. 3—LOWER STORIES of Wilson-Maney bent with end moments and stiffness factors indicated.

use formula II to calculate θ_b, θ_c, etc., for the column ABC—θ_f, θ_g, etc., for the column EFG—and so on across the width of the frame. In each case, work up from the bottom to the top of the column.

3. Compare the two sets of θ's as computed in steps 1 and 2. The closeness of agreement of the two sets of θ's indicates the degree of accuracy of the moments.

4. A second check may be obtained by using formula Ia to compute the R values for each column in the frame. Since $R = 0$ (very closely) for all horizontal members, all the columns in one story must have the same R value, and if computation of the R's by formula Ia does not give equal values for all the columns in one story, the moments must be incorrect. Care must always be taken to start with a member or members whose R values are known and usually there will be members for which $R = 0$.

At first glance it may appear that use of formulas I and II would be somewhat tedious. However, since loads are usually considered as acting at panel points, all the ΔM terms become merely M terms. At the worst, the ΔM terms are conveniently found by subtracting the first figure in the column of moment distribution computations from the last.

Side deflections

As well as assisting in the checking of moment-distribution computations, formula Ia presents a convenient method of computing side sway of rigid frames under either horizontal or vertical loading once the end moments on the members are known. It must be remembered, however, that true, and not proportional, values of K must be used to obtain correct results in deflection computations.

Example

An accompanying example has been worked out to give a numerical illustration of the method. The frame selected consists of the lower stories of the Wilson-Maney bent (Bulletin No. 80 of the University of Illinois Engineering Experiment Station and also "Wind Stress Analysis Simplified," by L. E. Grinter, Proceedings, Am. Soc. C. E., January, 1933). The end moments, as determined by slope deflection, and the K values of the members are shown on Fig. 3.

In this example, wind loads are applied only at panel points, and there are no vertical loads; hence there are no fixed end moments on any of the members. For this reason the ΔM's of formulas I, II and Ia are identical with the total computed end moments shown in Fig. 3.

The values are given in Tables 1, 2 and 3, which correspond to steps 1, 2 and 3 outlined above.

Improved Highway Design for Side-Hill Cuts

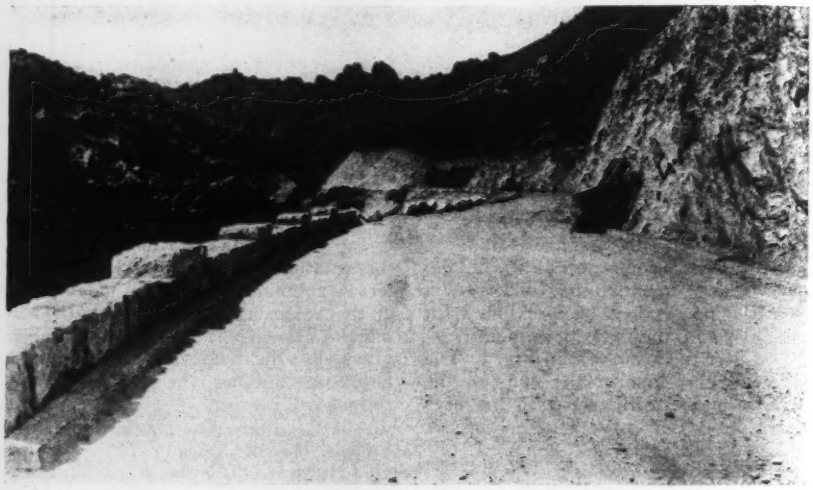
Elimination of inside ditch and shoulder by extending surfacing to toe of cut reduces side-hill scar, volume of excavation and stops water seepage under roadway

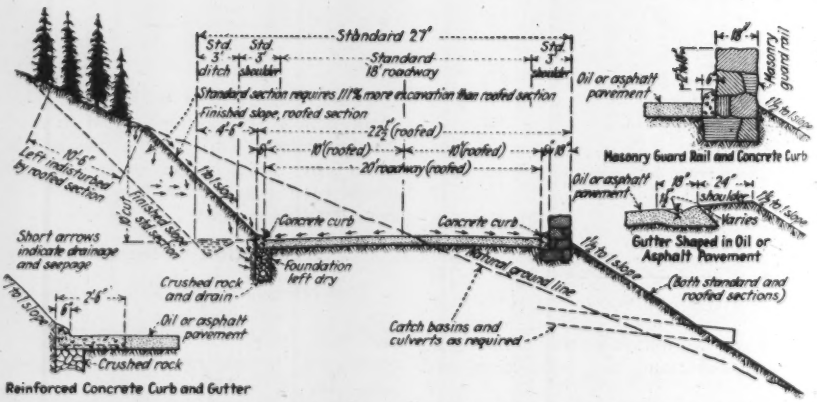
By F. A. Kittredge
Chief Engineer, U. S. National Park Service

ORIGINATED to reduce the side-hill scar made by highway construction operations in national parks, the National Park Service has developed a design for mountainside highways which has the additional advantages of reducing excavation, increasing travelable roadway width and, above all, eliminating the hazards of a softened roadbed resulting from seepage. In this design the usual ditch and shoulder on the inside of the cut is eliminated, and the paved surface is extended to connect directly with the toe of the excavation.

Drainage water is carried by the customary outlets under the fill, and a gutter depression and curb along the outer edge eliminates softening of the fill caused by water flowing off the paved surface. Thus there is a complete roofing of the surfaced width from toe of cut to edge of fill so that neither water falling on the road surface, that flowing down the slopes nor that ordinarily flowing in the ditches can get under the pavement.

CURB AND GUTTER BORDERS increase effective road width, reduce seepage into foundation and decrease landscape disfigurement.





SECTION OF SIDE-HILL HIGHWAY, showing advantages over standard construction.

Moisture is prevented from softening the subgrade and causing the usual weakening of the foundation of the pavement and upheaval due to swell and freezing. This development has been under way for more than three years, and test sections have been tried out successfully in Yellowstone National Park and in the Pinnacles National Monument. The results indicate that the design advantages are attained.

The reduction of the side-hill scar produced by highway construction has been a matter of study for years by the National Park Service because of the desire to produce a minimum of artificial change in scenic and recreational areas. Modern highway widths on steep mountainsides result in an uphill scar of barren rock in addition to a downhill fill, making the total area disturbed of objectionable extent.

The most destructive agency in mountainside highways is the water that collects at the edge of pavement, on the shoulder and in the ditch, and then seeps under the pavement edge, to undermine the whole foundation and sooner or later cause disintegration and crumbling of the road surface. The new design eliminates the troublesome pavement edge and prevents or minimizes the infiltration of surface water to the pavement foundation.

It has seemed to the writer that on moisture-collecting mountainsides our standard highway section in many cases invites and promotes destruction of the pavement. We have been accustomed to open subsurface water channels on side-hill cuts and to collect in the ditch and on the shoulder the surface water flowing from the paved road, from the cut slope and from the mountain slope above. This water is collected in the ditch and from there soaks down and then under the pavement until the foundation has become thoroughly saturated. Thus the ditch can carry away only what the foundation cannot soak up and pass through. The action of traffic on the pavement surface undoubtedly tends to bring water up to the bottom of the pavement and thus weaken any foundation support that may hitherto have escaped actual moistening or saturation.

The customary design for a highway section in side-hill cuts provides approximately a 3-ft. shoulder inside the roadway and a 3-ft. ditch next to the toe of the cut. This 3-ft. horizontal distance obviously increases the depth of cut, the width of the scar, and the volume and the depth of fill area on the downhill side. The elimination of this 6-ft. strip, by extending the surfaced roadway directly up to the toe of the cut and providing a shallow gutter, was the original step in the improved design.

As shown on the accompanying drawing, this change in design effected the reduction of a 10½-ft. width of side-hill at the top of the cut, in addition to saving more than 50 per cent in excavation. The reduction in scar area above the highway is considered, in itself, sufficient justification for the new design; but other advantages also are apparent.

The roofing of the entire surface of the cut to the toe of the fill has an important bearing on the problem of drainage and maintenance. The usual provision of a ditch to take care of side-hill and highway drainage results in an inevitable seepage and moistening of the subsurface material, even though the actual flow may be diverted at various intervals under the highway. This effect is particularly noticeable in many of those national park areas where high elevations mean melting snow and ice for an extended period.

The utimate result of this seepage is to soften the shoulder and in many cases produce a ragged pavement edge. Further, maintenance of this ditch in unsurfaced material is an expensive item. In contrast to this condition, the new design, with a surfacing extending to the toe of the cut, intercepts side-hill water as well as the drainage from the pavement, all of which is completely diverted under the surface through grillage, catchbasins and the usual drainage system. In order to prevent and intercept seepage from the slopes and that which is below the cut surface, a porous drain composed of loose rock and open-tile drain is provided under the edge of the surfacing.

The gutter depression and curb that has been introduced along the outer edge of the surfacing is effective in preventing erosion of the fill and the consequent maintenance work. Where local conditions require it, a masonry wall can be used on the outer edge as a safety and guard feature.

Although a 6-ft. width of shoulder and ditch is eliminated on the upper side of an 18-ft. roadway, the traveled roadway (pavement) can be increased to 20 ft., while the over-all excavation is reduced by a 5-ft. width. This change effects a 50 per cent reduction in excavation with a 45-deg. side slope. An intangible benefit is obtained in the resulting reduction of side-hill scar, particularly important in national parks.

Civil Engineers Publish Revised Salary Figures

New report by the committee on salaries of the American Society of Civil Engineers modifies March report on rates and sets up new classifications of positions—New York regional committee reports on similar subject

A REVISED SCHEDULE of prevailing salaries for civil engineers, amending a similar report made in March of this year, was submitted to the board of direction of the American Society of Civil Engineers at its recent meeting at Vancouver and was approved by the board as a tentative finding on the subject. The earlier report was published in our issue of March 15, p. 359. The salary statistics studied have been expanded to include a preliminary review of statistics relating to 28,000 men in addition to the 16,000 studied in detail in making the earlier study, and the classifications of positions used in the March report have been simplified. Percentage figures for determining regional rates also have been modified somewhat. The grouping of states into regions as used in the report is not considered ideal but has been retained until a better one can be developed. The grouping is that employed by the Bureau of Public Roads.

The report was submitted to the board by E. P. Goodrich, New York, chairman of the committee. In revising the report special care was exercised to avoid the use of misleading terms such as the word "appropriate," which caused so much adverse comment upon the earlier report. That report was so worded that hasty reading indicated that the salary rates given were what the society considered appropriate salaries for the classes indicated rather than prevailing salaries. The study was made not with the idea of setting *ideal* rates but rather to determine *prevailing* rates for use in efforts to check the payment of less than prevailing rates on work financed under the Recovery Act, also as an aid in establishing rates for engineering employees under the construction industry codes. The report follows:

Prevailing salaries

This report is an effort to determine from statistical data the salaries of civil engineers. It is based on the surveys of salaries made by the committee on salaries of the American Society of Civil Engineers in 1930 and again in 1933 on reports recently received from local sections of the society

and from many other sources. It is intended to set forth the prevailing rates of salaries of civil engineers as of the first quarter of 1934.

Method of determining rates

The salaries paid to 16,046 engineers and engineering assistants in the highway departments of the 48 states in 1930 are taken as the basis of the calculations. Median salaries have been determined from numerous plottings. Fifty per cent of the engineers received these salaries or more. Fifty per cent received less. Seven classifications of positions are adopted, and the median salary for each has been determined. Combining these, a schedule of salaries for the different classifications is set up as an index. This index has been carefully compared with other indices for previous years and with actual salaries of 28,400 engineers under other conditions of employment. The effect of various geographical and social conditions permits the derivation of factors whereby the index schedule may be used in the calculation of salary rates.

Regions

Local cost-of-living conditions and other factors permit the division of the United States into regions over which these, or other, conditions indicate a variation in the salaries paid. The Bureau of Public Roads of the United States Department of Agriculture recognizes nine such regions, and these same regions have been adopted in this study. These regions are:

New England: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

Middle Atlantic: New York, New Jersey, Pennsylvania.

East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin.

West North Central: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas.

South Atlantic: Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida.

East South Central: Kentucky, Tennessee, Alabama, Mississippi.

West South Central: Arkansas, Louisiana, Oklahoma, Texas.

Mountain: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada.

Pacific: Washington, Oregon, California.

Classification of positions

Information relating to the duties, responsibilities and salaries of the engineers of the highway departments permits a relatively simple classification of positions which further have been taken as the basis for salaries of civil engineers engaged in other than highway work. These classifications, for which key salaries have been determined, are defined as follows:

1.—*Duties:* Under immediate supervision, to assist on engineering work in field or office; to make simple measurements and sketches; make and check simple computations; to make tracings and simple drawings from sketches and record plans; to do neat lettering of various forms; to assist in the compilation of engineering data; to assemble and file engineering plans, specifications and records; to perform the usual work of a rodman, chainman, tracer or junior draftsman.

Requirements: Education equivalent to graduation from a high school, with at least two years of experience in office or field assisting on engineering work.

2.—*Duties:* Under supervision, to perform technical work in the office or field requiring a knowledge of engineering practices and methods; to make working drawings and designs and prepare estimates; to make computations of a technical character; to perform minor surveys and construction inspection. This classification includes the positions usually called junior engineer and levelman, and the lower grades of draftsman and inspector.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing, plus about two years of experience on engineering work; thorough knowledge of the care, operation and adjustment of engineering instruments; ability to design simple engineering structures.

3.—*Duties:* Under supervision, to take charge of a field party, a drafting squad or inspection of construction; to make and check quantity and cost estimates; to lay out work and draw plans and detail drawings; to check working drawings and fabricator's details; to keep records; to make reports. This classification includes the higher grades of draftsman and the positions usually called transitman, engineering inspector, detailer, checker, squad boss and chief of party.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing plus about three years of experience in engineering work; ability to exercise engineering judgment and skill; ability to plan operations in office or field.

4.—*Duties:* To perform important engineering work in office or field requiring the exercise of independent engineering judgment and skill; to make studies, estimates and reports; to prepare designs and specifications; to supervise the work of draftsmen, of field parties or of a group of inspectors on construction work. This classification includes the positions usually designated as designer, designing engineer or special inspector.

Requirements: Education equivalent to graduation from a college or technical school of recognized standing plus about five years of experience in engineering work of which at least one year shall have been in responsible charge; eligible for corporate membership in one of the national engineering societies, or for license as a professional enigneer.

5.—*Duties:* To be in responsible charge of a minor engineering organization or to have immediate administrative and technical charge of a division (comprising several squads or parties in office or field) in a large organization; to plan, direct and supervise the design or construction of engineering projects; to supervise the preparation of contracts and specifications and to be entirely responsible for the engineering construction and business operations of his division, bureau, section or department; to have immediate responsible supervision of the work of draftsmen, designers and assistant engineers. This classification includes the positions usually designated as engineer, resident engineer and section engineer.

Requirements: A first-class technical education plus about eight years of professional experience in the active practice of engineering; ability to plan, design and supervise engineering works.

6.—*Duties:* To be in responsible professional and executive charge of a major division of work on a large engineering project, involving planning, designing and supervision of construction; to give independent, critical engineering advice for executive action incidental to such work; to assume professional and executive responsibility for the whole of a smaller engineering project. This classification includes the positions usually designated as division engineer, senior engineer, assistant chief engineer, or chief engineer (of a minor organization).

Requirements: A first-class technical education supplemented by cultural and economic studies, plus about eleven years of broad professional experience embracing a thorough knowledge of engineering office methods, field work, design, construction and business administration.

7.—*Duties:* To have entire charge of and be responsible for entire organizations comprising more than one engineering division and engaged in more than one class of work; to determine and establish technical and administrative policies and procedures; to be responsible for all engineering design, construction and business operations; to investigate all engineering projects submitted for consideration and to report critically regarding feasibility, cost, economic justification and public necessity or convenience. This classification includes the position of chief engineer of a major organization.

Requirements: A first-class technical education supplemented by cultural, economic and social studies, plus about fifteen years of broad professional experience embracing a thorough knowledge of engineering office methods, field work, planning, design, construction, maintenance, operation, engineering economics, contract law and business administration; recognized standing in the engineering profession.

Index schedule

The index schedule combines the classifications of positions with the median salary for each classification. Salaries derived from the 1930 survey are shown by the later surveys to have suffered, in common with incomes from other sources, reductions differing locally but in general variable with relation to their size—i.e., the larger reductions being observed in the higher salaries. The following is set up as the index schedule showing both actual median 1930 salaries and the actual reduced median salaries as of the first quarter of 1934. These salaries thus constitute "key" salaries, from which, by the use of factors, salaries for other situations may be derived.

Classification	1930	1934
1	$1330	$1200
2	1824	1620
3	2280	2000
4	3000	2600
5	4100	3500
6	5400	4600
7	7000	6100

Fifty per cent of the engineers in each position classification in the schedule receive the salary shown or more. Fifty per cent receive less. As an example of the distribution of individual salaries within one particular classification, it is observed that of the salaries of assistant engineers (corresponding to classification 4) in state highway departments, some 6 per cent receive about 28 per cent more than the

median; 22 per cent receive about 15 per cent more than the median; 48 per cent receive about the median salary; 20 per cent receive about 11 per cent less than the median; and 2 per cent receive about 23 per cent less than the median. Detailed analysis of other classifications shows somewhat similar patterns.

Regional factors

To the indicated key salaries there should be added or substracted amounts indicated by regional factors determined from early 1934 actual data. Further, to these figures, when so adjusted, other factors are applicable, dependent upon other conditions.

The regional factors for 1934 were found to be as follows:

	Per Cent
New England	+ 3
Middle Atlantic	+ 15
East North Central	+ 6
West North Central	— 5
South Atlantic	— 15
East South Central	— 15
West South Central	— 10
Mountain	— 10
Pacific	+ 5

In local jurisdictions where it can be shown that the costs of living have not changed from 1930 to 1934 in accordance with this table, the proportionate factor may be employed subject to further modification by population or other factors.

Population factors

The surveys indicate that for those employed in cities of 1,000,000 population a further increase in salary is required to conform to prevailing rates in the amount of 10 per cent, and that in New York City, with a population of approximately 7,000,000, a present factor of plus 30 per cent is applicable. Factors for other cities must be determined from local experience; the data available do not yet indicate these required factors for cities with other populations.

Types of employment

The above index schedule, adjusted by regional and population factors, applies to engineers engaged in work similar to highway work and resident under similar conditions. Data relative to 28,400 engineering positions of different character justify increased salaries for those employed in certain other types of work or organizations. In general, those in city employ are found to conform to the adjusted index schedule. For those many selected individuals, such as those in quasi-public employment, in industry or in private organizations, the adjusted key salaries are observed to be subject to further increases, often in quite substantial amounts. Furthermore, it should be kept in mind constantly that the figures indicated in this report were all determined on the basis that 50 per cent of all the engineers regularly employed receive these adjusted key salaries or more, while 50 per cent receive less.

Federal engineers have had their 15 per cent reduction restored to the extent of 5 per cent on Feb. 1 and 5 per cent on July 1, 1934.

Statistically, the outlined system is believed to be justified, using the median salary as the primary basis. Such a system, however, cannot take into account unusual requirements or conditions or matters of particular circumstance in respect to those engineers upon whom great responsibility is placed. There is no certain method of standard appraisal of the worth of intelligence, knowledge, experience, administrative ability, enthusiasm and activity; it has not been possible to determine the amount of additional compensation now paid for them. The above analysis, however, is believed to afford a statistical basis to which an appraised value of these intangibles may be applied.

New York regional rates

A report on salaries for various grades of engineering work in the New York metropolitan district, which differs from the foregoing report chiefly in that it is an attempt to establish minimum rates rather than to determine prevailing rates, was submitted to the principal regional engineering organizations recently by the metropolitan regional committee on engineers' employment and salaries. The committee was organized in November of last year upon the recommendation of the Metropolitan Section of the American Society of Civil Engineers for the purpose of preparing a schedule of classifications and minimum salaries for engineers that could be used by the regional code authority of the engineers' division of the construction industry, if and when established, as the basis for its determination of minimum rates in the New York metropolitan district. Twenty societies, local sections of the national societies and local chapters of the New York State Society of Professional Engineers, were represented on the committee, also the Federation of Architects, Engineers, Chemists and Technicians. D. B. Steinman, past president of the New York State Society of Professional Engineers, acted as chairman.

The classifications of the regional committee report are substantially identical with those contained in the report of the committee on salaries of the Am.Soc.C.E., as they were prepared in cooperation with that committee. Educational requirements, however, are modified by the elimination of experience requirements for the two lower grades. Names for the various grades, similar to those in the March report of the committee on salaries, have been retained.

A range of salaries for each grade has been included in order to indicate the appropriate range for each classification. In the lower classifications the minimum rates correspond closely to those given in the salary committee report plus the 30 per cent factor for the New York district proposed therein. The rates are as follows:

Grade	Per Week
1 Engineering assistant	$ 30 to $ 50
2 Junior engineer	40 to 60
3 Junior ass't engineer	50 to 75
4 Assistant engineer	75 to 150
5 Engineer	100 to 200
6 Ass't chief engineer	150 to 300
7 Chief engineer	250 to 1,000

This report of the New York metropolitan regional committee has been submitted to the several organizations represented on the committee for approval.

Work Under Way on Los Angeles Union Passenger Terminal

PREPARATORY WORK on the Union Passenger Terminal, being built in Los Angeles for joint use of the Santa Fe, Union Pacific and Southern Pacific railroads, is well under way, building having been removed from a large portion of the site and about 100,000 cu.yd. of the required fill having been placed. The new depot will be on the old plaza site, which the city preferred to the location desired by the railroads. Agreement to use the plaza site was reached after the city obligated itself to provide $1,000,000 toward the project (estimated total cost almost $9,000,000) if the railroads would build at this site. The new depot is to be ready late next year.

Prior to 1885 the plaza site was a portion of the bed of the Los Angeles River, the underlying formation being sand and gravel to a considerable depth. This has been accepted as foundation for the 15-ft. fill that is to support the yard, tracks and structures, the fill being compacted in layers as built up by spreading, sprinkling and rolling. Subways to accommodate street traffic will be put through this fill at Macy St. and in or near College St.

The three railroads will be joint owners of the new terminal on the following basis: Southern Pacific, 44 per cent; Santa Fe, 33 per cent; Union Pacific, 23 per cent. Joint committees, each having representatives of all three roads, are handling details of the project; there is one joint committee representing the vice-presidents and general managers and another representing the engineering departments. Subcommittees on architectural, signal, electrical, structural and mechanical matters report to the engineers, the personnel of each subcommittee being drawn from all three railroads.

The joint committee on engineering is composed of the chief engineers of the three railroads—namely, W. H. Kirkbride, Southern Pacific; H. C. Mann, Union Pacific; and M. C. Blanchard, Santa Fe. Construction is in charge of A. J. Barclay, of the Southern Pacific engineering staff.

Book Reviews and Notes

A monthly Commentary on Current Additions to the Civil Engineer's Library

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A Valuable Work Revised

HIGHWAY ENGINEERING—By John H. Bateman. Second Edition. Cloth; 6x9 in.; pp. 441; photographs and diagrams. Published by John Wiley & Sons, Inc., New York. $4.

The new edition of Professor Bateman's "Highway Engineering" maintains the position it took on publication six years ago (*ENR*, May 19, 1928, p. 786) as one of the best textbooks on its subject. While organized primarily as a text for students, the practicing highway engineer will find in the contents a summary of his fields of work which can be read with interest. As revised, the 29 original chapters and three new chapters bring the summary of principles and practice as closely up to date as can be expected in a field of engineering in which new developments are constantly coming to notice. As in the first edition, the order of subjects is: economics, financing, location, design, construction, maintenance and operation.

New Pocket Companion

CARNEGIE POCKET COMPANION; Leather; 6x9 in.; pp. 524; tables and diagrams. Published by Carnegie Steel Co., Pittsburgh, Pa. Price upon request to the company or district offices.

The well-known Carnegie Pocket Companion, structural steel handbook of the U. S. Steel Corp., is out in a new dress and a new size to celebrate its twenty-fourth edition. Covering the sections rolled by both Carnegie Steel Co. and Illinois Steel Co., the new edition is more complete than ever before; it supersedes and cancels all previous editions. Principal divisions of the topical index are profiles, elements and dimensions, beam safe loads, plate girders, column safe loads, structural details, floors, roofs, structural timber, mensuration and functions of numbers.

City Government by a Manager

THE CITY-MANAGER PROFESSION—By Clarence E. Ridley and Orin F. Nolting. Cloth; 5x8 in.; pp. 135; tables. Published by The University of Chicago Press. $2.

In 1908 the mayor and bi-cameral council of Staunton, Va., weary over the inefficiency of council committees in handling administrative problems, passed an ordinance authorizing the hiring of a "general manager" and delegated to him the direction of all administrative affairs. Today there are 448 cities and counties governed by the council-manager plan, under which an elective council appoints an administrative official, chosen for his training and ability rather than his political prowess. These executives have acquired the characteristics of a profession and it is the purpose of this volume to discuss the various aspects of that profession to inform citizens and councilmen of the present status of city managership. With that as its purpose, the book is addressed to the interested and intelligent citizen rather than to the expert in governmental problems. Among the topics discussed are the character of the city manager position, the manager's qualifications, his training and his selection. The professional aspects of managership are also presented in some detail. The authors are respectively director and assistant director of the International City Manager Association.

British Report on Steel Structures

Reviewed by Robins Fleming
American Bridge Co., New York

STEEL STRUCTURES RESEARCH COMMITTEE, SECOND REPORT. Department of Scientific and Industrial Research (British). Paper, 6x10 in.; pp. 369, numerous diagrams, halftone illustrations and tables. Published by H. M. Stationery Office, London. 7s 6d net. British Library of Information, 270 Madison Ave., New York. $2.15.

THE FIRST REPORT of the British Steel Structures Research Committee, dated 1931, was reviewed in *ENR*, of Feb. 18, 1932, p. 259. The high grade of scholarship and the eminent names which marked that report are also features of the second report.

The report contains a very brief account on the progress of research, which is followed by 30 pages on the effective length of a column, and this in turn by a dozen pages on some observed stresses in an existing structure.

The remainder is given over to the main subjects of investigation which are: beam and column connections; bolts and bolted joints; analysis of moments under vertical loads in a steel building frame; stress analysis of steel building frames; stress distribution in a number of three-story frames and welding of steel structures. Each subject is treated at length and in considerable detail. The engineer may not care to follow the mathematics throughout, which are often quite abstruse, but he can adopt the conclusions given.

"The Stress Analysis of Steel Building Frames," by J. F. Baker, will probably be the first section turned to by many. Part I of this section, a general analysis, is a slope-deflection method. Part II, routine method of analysis, illustrates the moment distribution method of Prof. Hardy Cross. The method is extended to semi-rigid frames. Part III, mechanical analysis, is based on a paper by Dr. Baker published by the Institution of Civil Engineers. No mention is made of Professor Beggs and the work he has done in this line. It may be noted that the Cross method as well as that of mechanical analysis has received far less attention in British engineering literature than in that of the United States.

American Industry Not Overbuilt

AMERICA'S CAPACITY TO PRODUCE—By Edwin G. Nourse and associates. Cloth; 6x9 in.; pp. 608; tables and diagrams. Published by The Brookings Institution, Washington, D. C. $3.50.

DURING recent years many engineers have been disturbed now and then by comment to the effect that the productive capacity of our industries has been vastly overbuilt. Economists, editorial writers, disciples of this, that or the other theory of economic reform have predicated many conclusions on that premise. Naturally, if it is well founded, the engineering profession and the construction industries might have good reason to mistrust the future and the opportunities it holds for them. This volume presents a study designed to ascertain the facts. It seeks to determine the general trend of capital expansion in the United States and the capacity of our productive plant and labor supply to produce the goods and services required by our society. It will be followed by three others, which will deal in similar spirit with our capacity to consume, the financial aspects of productivity and the effect of income distribution upon economic progress.

After a detailed analysis of capacity in the domain of raw materials, fabrication and services, the authors reach the conclusion that there is little basis for the belief that our capacity has been extravagantly expanded. They find a surplus of capacity over production for the period 1925-29 of less than 20 per cent, and, even more significant, they find that this margin of excess capacity was not expanded during the period from 1900 to 1930. Other findings, together with the wealth of factual and statistical detail assembled to show conditions in the several industries under examination, will be of exceptional interest to engineers who seek a practical and reasonable answer to this disturbing question which has so intimate a relation to their welfare.

Miscellaneous Notes on Booklets and Reprints

FIFTY REPORTS on mechanical power transmission by Robert W. Drake have been published by the American Leather Belting Association, 41 Park Row, New York City. Price, 25c.

FACTS RELATING TO UNIFICATION of the three rapid transit systems in New York City are included in a pamphlet published by the Citizens Budget Commission, 350 Madison Ave., New York.

EXAMINATION QUESTIONS FOR CIVIL ENGINEERS given in the past in Michigan State registration tests are published in Bulletin 56, Michigan Engineering Experiment Station, East Lansing, Mich. Price 50c.

REINFORCED BRICKWORK, Bulletin No. 46 of Rensselaer Polytechnic Institute, Troy, N. Y., contains the report of a series of tests on reinforced brick beams in which the bricks alone were the variable quantity. The booklet is written by H. Duff Williamson of the department of civil engineering.

LEGAL ASPECTS of the current movement for low-cost housing and slum clearance are presented in a 122-page symposium of 13 articles contained in the quarterly magazine, "Law and Contemporary problems," published by the Duke University School of Law, Durham, N. C. Price, 50c.

WATER-POLLUTION RESEARCH carried forward by the Department of Scientific and Industrial Research (Great Britain) is summarized in its annual report for the year ending June 30, 1933. Copies may be obtained from the British Library of Information, 270 Madison Ave., New York City. Price, 35c.

THE DESIGN OF SPECIAL SLIDE RULES is considered in Bulletin 32 of the Engineering Extension Department of Purdue University, Lafayette, Ind. The booklet, written by J. N. Arnold, professor of engineering drawing, describes several examples of special slide rules, devotes about ten pages to the theory of special slide rules, and also outlines the method of constructing them.

DEMOLITION PROCEDURE for a comprehensive program of slum clearance is outlined in a booklet of the National Association of Housing Officials, 850 East 58th St., Chicago, entitled "Demolition of Unsafe and Unsanitary Housing." The booklet contains suggestions concerning organizational procedure, the checking of mortgage and ownership records and the resolution of various legal difficulties that must be surmounted. Free to public officials, 25c. per copy to others.

ENGINEERING ACCOMPLISHMENTS in famine prevention and relief projects carried on during 1932 and 1933 under the China International Famine Relief Commission, Peiping, China, are described in publication No. 38, Series A, of the commission, issued March, 1934. Under the direction of Oliver J. Todd, an American engineer, the commission has carried forward a notable amount of road work, dike construction and river-bank protection, also irrigation canals and control works. The work has been in progress since 1920.

New Books and Revised Editions

[Those desiring copies of the books listed below or mentioned elsewhere in this section should order them from the publishers or from their local booksellers.]

APPRAISING RESIDENTIAL PROPERTY: Methods, Cost Data and Instructions—Paper; 6x9 in.; pp. 99; tables. Published by Cuthbert E. Reeves, Buffalo, New York. $2 . . . *Prepared as a guide to appraisers for underwriters of home financing such as those of the Home Owners' Loan Corporation.*

INDEX TO THE JOURNAL AND OTHER PUBLICATIONS OF THE AMERICAN WATER WORKS ASSOCIATION, 1881-1933—A. V. Ruggles. Cloth; 6x9 in.; pp. 231. Published by American Water Works Association, New York. . . . *Papers and discussions are classified according to major topic. Under each major heading papers are arranged chronologically. The author index refers only to the volume and page numbers on which an article appeared.*

PORT OF BALTIMORE, MD.—Port Series No. 16, Part I. (Revised 1933). Paper; 6x9 in.; pp. 328; photographs, maps and tables. For sale by the Superintendent of Documents, Washington, D. C. 50c.

THE STORY OF SKYSCRAPERS—By Alfred Morgan. Cloth; 5x8 in.; pp. 210; photographic illustrations and diagrams. Published by Farrar & Rinehart, New York. $2.

SKYSCRAPER—By Elsa H. Naumburg, Clara Lamber and Lucy S. Mitchell. Cloth, 8x10 in.; pp. 180. Chiefly photographs with exposition and verse. Published by John Day Company, New York. $2.00. . . . *The two books on skyscrapers listed above are not technical works but are children's books. They are noted here to characterize them for engineers who may have seen them listed elsewhere without notice of their character, also for the information of engineers who seek interesting books on engineering subjects for their boys.*

WATER SUPPLY PROBLEMS AND DEVELOPMENTS—By W. H. Maxwell. Cloth; 6x9 in.; pp. 254; photographs and diagrams. Published by Sir Isaac Pitman & Sons, Ltd., London, and Pitman Publishing Corp., 2 W. 45th St., New York. $6.00.

Letters to the Editor

Seattle's City Engineer

Sir—Your editorial, "Creeping Paralysis," in the July 12 issue, has greatly interested me, as I was associated with the late Mr. Dimock in the city engineer's office in Seattle for many years when R. H. Thomson was both city engineer and chairman of the board of public works.

Mr. Thomson was the best city engineer that Seattle ever had. He was not only an excellent engineer, a former director of the American Society of Civil Engineers, but he was enough of a politician to know how to handle the crude work of some the embryo lawyer-politicians, and it was a delight to his subordinates to see how diplomatically he did it.

Since his time Seattle has had many excellent city engineers, in so far as engineering predominates, but many of them have lacked the additional qualities that are so necessary in dealing with the general public. It seems that such qualities can never be taught in the engineering schools, and the only way to acquire them is from the school of experience. Some engineers do not even have the disposition to obtain them.

Will Humphrey, recently removed from a federal office by President Roosevelt after having been appointed for a six-year tenure of office by President Hoover, was corporation counsel for the city of Seattle during part of the Thomson régime. The office of corporation counsel was always a hotbed of politics in Seattle, but the politicians in those days were wise enough to respect the city engineer's office in their patronage raids.

WALTER S. WHEELER.

Dover, N. H.,
July 15, 1934.

Bearing Power in Foundations

Sir—In his letter of May 3, 1924 (*ENR*, June 7, 1934, p. 747) H. J. Summers withdraws his previous statement in which he gave me credit for the perimeter theory of bearing capacity. Supplementing the contents of Mr. Summers' letter I wish to communicate the following facts:

The reason why Mr. Summers' first statement escaped my attention was that I stopped reading the paper after glancing over the formulas and after realizing that the paper contained neither the results of test borings nor any data concerning the proposed structure. I not only deserve no credit whatsoever for the theory, but I emphatically rejected the theory as soon as it came for the first time to my attention. (See *Transactions*, Am.Soc. C.E., Vol. 93, 1929, p. 392.) During the five years which have elapsed since the publication of my protest, my opinion concerning this theory has not changed in spite of further accumulation of experience with related problems.

KARL TERZAGHI,
Professor, Technische Hochschule.

Vienna, Austria,
June 20, 1934.

ENGINEERING NEWS-RECORD

EDITOR—F. E. Schmitt. EDITORIAL STAFF—V. T. Boughton, W. G. Bowman, F. W. Herring, C. S. Hill, H. W. Richardson, J. I. Ballard, W. W. De Berard, N. A. Bowers.

Published by McGraw-Hill Publishing Company, Inc.
Editorial and Publishing Offices at 330 West 42d Street, New York

July 26, 1934

Volume 113, No. 4

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The Jobless Billions

MONEY has suffered from unemployment as severely as men during the four years of depression, and like men it is anxious to find a job. Though for several years it was quite particular about the terms under which it was willing to accept employment, it now seems to be ready to take a more reasonable view; the pressure of idleness is becoming compellingly strong. The terms on which New York City borrowed money last week—interest rates ranging from 1 to about 3½ per cent for maturities up to ten years—is as clear evidence of this as the ready sale of San Francisco bonds some weeks ago at a rate well below 4 per cent. On both sides of the continent the jobless billions are trying to get back to work, evidently confident that they will be secure in their new employment. For the present they are looking for public jobs, but it may be expected that soon they will also be glad to get private employment. And this last is important, for until the employment of capital by private enterprise once more reaches fair proportions, its employment for public uses has only limited security.

Achievement

ALL WHO SHARED in the hopes and efforts of the public-works campaign initiated by the Recovery Act will join in sincere regret at Henry M. Waite's approaching retirement from the task to which he has given more than a year of arduous service. His devotion to that service is recognized the country over, even by the strongest critics of the Public Works Administration. The constructive results of the campaign stand largely to Colonel Waite's credit—credit the greater for the numberless administrative and political difficulties that beset the work. Drafted to the task weeks before passage of the act, he, together with Col. George R. Spalding, developed a plan and organization that gave promise of assuring jobs to a million idle workers before winter; and, though that plan was wrecked on the rocks of politics and bureaucracy, Colonel Waite set about with undiminished courage to do the utmost that human vigor and devotion could accomplish under the limitations imposed. His work since then constitutes an achievement in which the entire profession takes pride.

Draining Road Cuts

ROADWAY DRAINAGE in side-hill cuts often presents a problem that exercises the wits of the highway engineer. An inside ditch to receive the upland surface water brings the hazard of seepage through the subgrade and sloughing and sliding of the downhill fill. Providing a paved ditch, or the equivalent resort of widening the pavement to the toe of the cut, as described in this issue, eliminates the danger of seepage-softened subgrade but does not lessen and commonly magnifies the problem of disposing of the collected water. The simple expedient of catchbasins with downhill discharge pipes is not always possible. The right of the downhill land owner to be secured against such overflows is established by strict and complex laws, and the roadbuilder must take his gutter or ditch discharge to where the law allows or else purchase easements for his catch-basin outflow. There are many places, however, where tight pavement close to the slope of the cut solves the drainage problem and effects a reduction in construction and maintenance costs

At Last a Yardstick

FIGURES for prevailing rates of engineering pay, reported to the board of direction of the American Society of Civil Engineers two weeks ago, strengthen the factual basis for constructive action on matters of professional compensation. The new figures, a revision of those published in March, are the result of a restudy of the pay classifications of state highway departments (used in the preparation of the March figures) supplemented by a review of pay records relating to a much larger number of men in comparable positions. No major changes have been made in any but the lowest grade of engineering assistant; there the base rate has been lowered. This is interesting in view of the scattered but loud protest that followed publication of the March statement. Analyzed, most of that protest was due to a misunderstanding of the fact that the statement set forth *prevailing rates* actually paid to a large number of men in the profession, *not ideal rates* that the profession thinks should be paid to its members. The fuller study made since March indicates that the figures given in the new report can be used with confidence as a measure of what engineers in the several classifications set forth in the report should be paid if they are to be paid at prevailing rates. These figures will be especially valuable during the coming winter if a large program of relief work has to be organized. They have broader and more lasting application in making available to city officials and other public and private employers a yardstick for determining what grade of professional service they are paying for, and in comparing with it the grade that they know their work requires.

Too High?

THE TRAINING REQUIREMENTS for the lower grades of engineering assistant in the classifications which form a part of the American Society of Civil Engineers' revised statement on salaries raise certain doubts as to whether they are not set too high. The two bottom grades are expected to have, in addition to certain scholastic requirements, two years' experience on engineering work. Classification 1, which includes rodmen, chainmen, tracers and junior draftsmen, calls for high school graduates; but any intelligent boy who has graduated from high school does not need two years of experience in engineering to fill any one of these positions satisfactorily, and it is an interesting question on what type of engineering work he could be employed in gaining the two years of experience if not in such jobs. Classification 2, including junior engineer, levelman and the lower grades of draftsman and inspector, calls for training equivalent to graduation from a technical college; but such a graduate should not need more than two

weeks under capable direction to put him on his feet in his new job. This view of the case seems particularly significant because one purpose of the classifications set forth in the report is to help an employer to grade his men properly. If he is to adhere closely to the specified requirements, he could not classify a fresh graduate higher than a rodman, and in a good many cases this would be grossly unfair. The field and office-training experience requirements should be removed from both the lower classifications of the list.

Self-Administration

THE AMERICAN ENGINEER, accustomed to either uncontrolled professional activity or the limited regulation accomplished by state licensing systems, may observe in British Columbia an example of self-administration unknown south of the line. The engineers of that province constitute a truly self-governing professional body, which controls its own admission and certification and at least in theory is clothed with official power to regulate and supervise the conditions of practice. They succeed, moreover, in implanting the professional spirit in the student engineer at the very threshold of his life work, a course that goes far toward keeping alive in him the inspiration of his early ideals of truthful objectivity regardless of the career he may later choose to follow. Our own licensing practice, though founded largely on the principle of regulating a business activity, is trending steadily toward the essentially different concept of establishing and safeguarding a professional group, as a necessary agency of serving the public interest. The British Columbia example shows one way, and an excellent way, to attain this objective.

An Eye to the Future

PROGRESSIVE HIGHWAY PRACTICE as reflected in the work of some of the coast states is no longer content to reckon with the 35- to 45-mile speeds that still serve as the basis of design in more sedate communities. Speaking before the Western Association of State Highway Officials recently, Oregon representatives told of basing their current design of roads on speeds of 90 to 100 m.p.h., at least to the extent of adjusting curvature, sight distance and smoothness of the road to permit of safe travel at such speeds—and, of course, this kind of design also means safer travel than now at the much lower speeds that are actually in use. Road officials of the neighboring state of Washington are planning their roads on a similar high-speed basis. Extreme as it may seem, such planning is to be welcomed, for it is based on courageous foresight. It recognizes that the improvement of vehicles has brought with it a progressive raising of the demands placed on road travel and that these demands are bound to grow further. Only too often road-builders have planned for a bare half-dozen years ahead, and indeed at times their plans have been outdated by the time the road was completed. To realize how rapidly standards change one need only look at the long-famous Columbia River Highway, built little more than a dozen years ago; the curves, grades and sight distances of that road, once ample to qualify it as a trunk highway of most advanced type, are now adequate only for leisurely sightseer travel. It is not unreasonable to anticipate like changes in requirements during the next fifteen or twenty years, and the highway planner who looks less than a quarter century ahead has not met his responsibilities.

Water Conservation to the Fore

ADVANCING SUMMER brings no relief from the unprecedented drought that began in the northern states in Spring and now holds in its grip virtually all of the United States. With its accompaniment of exceptional heat it has produced crop and stock losses, soil destruction and failure of water supplies on so large a scale as to tell more plainly than ever of man's dependence on water and warn insistently against the inadequacy of what we know and do about water conservation.

Within our own country the drought reaches impartially into the Central Valley and the East, into the semi-arid Plains and the western irrigation regions. While grains and garden crops wither in the central section, the low stage of irrigation canals in the West threatens large communities that are solely dependent on these supplies. No such wide distribution of drought incidence has been known since the country was settled. We face a new and severe experience—an emergency that has the proportions of national calamity.

Aside from its far-reaching economic influence—widespread distress, abrupt reduction of the surpluses that weighed down agricultural markets and pauperized a whole farm population—the drought is a threat to the very survival of great areas. It impresses upon the nation an imperative responsibility to study and plan how we may protect ourselves against recurrence or even more severe visitation of drought. Much of this study and planning becomes the civil engineer's duty.

Even in the face of drought losses it is cause for satisfaction that several of the gigantic national construction enterprises now in progress are designed to save and utilize waters heretofore wasted; that Boulder Dam, greatest of these, has progressed far ahead of schedule because of the energy of its builders; and that if the drought had waited a year longer the storage of that dam would have made the fertile regions of the lower Colorado secure. It is also a sastifaction to realize that the foresight of engineers has caused the study of both stream and ground-water resources to receive increasingly active attention. But the drought calamity necessitates far more purposeful and concentrated effort.

Water conservation is now in the front rank of public responsibility. What it requires is a strong and concerted program of national action to protect our waters, first and most vital of national resources. Accurate study of these resources and development of broad-gage plans for their conservation and control are the first essentials of that program.

Streams and stream storage require study with a view to maximum attainable conservation combined with control of floods. Both protection of quality and coordination and control of use will be found necessary. Underground waters, still largely unexplored, must be measured as to supply and depletion, and we must learn how to protect them against progressive lowering. Private wells and public supplies alike require consideration, to the end that future drought periods may find the whole community safeguarded.

It needs no argument to prove that so large and urgent an undertaking must rest on broad cooperation. Local and state authorities as well as the federal government are concerned first of all. But the civil engineering profession has large opportunity to participate. Both through its individual members and through its organizations it can contribute essentially to the progress and results of the work.

CURRENT NEWS

Structural Steel Code is Rejected by the A.I.S.C.

DIRECTORS of the American Institute of Steel Construction at a meeting in New York July 18, voted not to accept code No. 480 for the Structural Steel and Iron Fabricating Industry in the form approved by General Johnson's order of July 11, which deletes from the code all provisions governing erection work and places such work under the provisions of Chapter I of the construction code. The code prepared and sponsored by the institute provided for both fabrication and erection.

The board of directors decided that the separation of these two operations was unacceptable to the industry, "because it would be unduly oppressive on the smaller enterprises in the industry and would place an important and integral part of the industry under the Construction Code, the administration of which is dominated by purchasers of the product of the industry." Announcement of the approval of the modified code by General Johnson was published in last week's issue on p. 90.

Letter states views

In a letter addressed to General Johnson, the board of directors of the institute through its code committee chairman stated that "the erection work on structural steel fabricated by members of our industry has always been a necessary and integral part of our industry and members of our industry have heretofore expressed by hundreds of telegrams and letters filed with your administration their objection to any code for our industry which shall not cover the erection work on the structural steel fabricated by them. The elimination of the provisions of our code relating to erection work and the placing of such work under another code would destroy the effectiveness of the commercial provisions of our code and would seriously hamper the members of the industry in the normal conduct of their business."

Other provisions of the code to which exception was taken included the establishment of uniform minimum wage rates for common labor in the South and North, the creation of a minimum average rate of pay for shop labor equal to 150 per cent of the common labor rate and a reduction in the minimum hours to be worked per week. On the subject of estimating, which, according to the modified code, would be done by an estimating formula established by a firm of public accountants, subject only to the approval of the Administrator, "The industry cannot assent to be bound by an estimating formula in the preparation of which it would have no voice and which might under the provisions of the proposed paragraph be established without regard to the advice of those whose experience in the industry best qualifies them to prepare such a formula."

The code committee of the institute stated that it had expected that the proposed code, which was submitted by the committee and covered both fabrication and erection and had been prepared after nine months of negotiations with representatives of the NRA, would meet the approval of the NRA. The committee regretted the fact that the code as approved, and modified, differed to such an extent from the original code, which was approved by 80 per cent of the industry, that it was not acceptable.

"It is our understanding that since the industry does not accept the proposed changes in our code as set forth in your order, said code will not become effective on the date therein specified (July 22) and we shall notify members of the industry to that effect and send them a copy of this letter."

A late dispatch states that the effective date has been advanced to Aug. 6.

Site for Great Central Airport At Chicago to be Selected

Appointment of a combined local and federal committee to select the most suitable site for a central airport at Chicago has been announced by the Public Works Administration. There has been no pledge of federal financing for the building of such an airport but Administrator Ickes has stated that the committee would survey all possible sites and conditions and render a complete report. The technical services of Chicago city engineers and employees have been offered by the mayor to assist the committee.

At the present time an application for a PWA allotment of $8,600,000 to build an island airport in Lake Michigan on Chicago's waterfront is on file, but no acceptable method of securing such a loan has been presented which would permit the PWA to finance this project.

Housing Authority is Formed at Columbus to Plan Slum Clearing

The temporary organization of a municipal housing authority has been formed at Columbus, Ohio, to expedite a slum elimination program and advance a plan for general improvement of living conditions in the poorer sections of the city. The objective of the authority is the erection of small housing units, up to 50 families, rather than the construction of the larger type of units which have been projected in New York and other centers. Charles Chubb, head of the Ohio State University Department of Agriculture, is temporary chairman of the group.

Lower Otay Dam Renamed to Honor Engineer

The name of the Lower Otay Dam, which is an important structure in the water supply system of San Diego, Calif., has been changed to "Savage Dam" by the City Council, "in consideration of the achievements of the late Hiram Newton Savage, hydraulic engineer, in constructing the water conservation works of San Diego".

Ontario Hydro Commission Cuts Its Engineering Staff

In a drastic economy move the new Ontario Hydro Electric Power Commission has terminated its employment agreement with F. A. Gaby, chief engineer, and with I. B. Lucas, general solicitor, and has notified all employees receiving salaries over $5,000 a year that their employment agreement is terminated but that they may remain in the employ of the commission on a day-to-day basis in their present duties at such salaries as the commission may hereafter determine.

Mr. Gaby's salary as chief engineer was $29,070. The salary of the solicitor was $10,895, less than the salary of some of the men retained on the commission's day-to-day basis plan.

Among the engineers put on the day-to-day basis are the following: A. V. Trimble, engineer in charge of construction, $10,695; David Forgan, assistant to the chief of construction, $5,090; T. H. Hogg, chief hydraulic engineer, $13,520; O. Holden, assistant hydraulic engineer, $6,695; W. P. Dobson, engineer in charge of laboratory and inspection department, $6,170; and R. B. Young, chief assistant laboratory engineer in charge of testing, $5,090.

As another step in its economy program, the commission ordered work to be stopped on the commission's new $1,400,000 office building in Toronto but subsequently amended the order to permit continuation of the concrete work on the foundation in order that the adjoining buildings would not be endangered. Some months ago the former commission entered into a contract with the firm of Anglin, Norcross, Ontario, Ltd., for the erection of the building.

The Engineering Institute of Canada has formally protested against the action taken by the new commission in respect to its engineering staff.

New York Sells $58,000,000 of Serial Bonds at Low Rates

For refunding several large issues of special corporate stock notes, the City of New York, on July 19, sold $58,000,000 of long-term serial bonds with interest rates varying from 1½ per cent to 4 per cent. In addition, an issue of $12,000,000 of special corporate stock notes, due in ten months, and bearing an interest rate of 1½ per cent, priced to yield 1 per cent, was reported more than 50 per cent sold at the close of the first business day.

The notes which are redeemed by the $58,000,000 bond issue provide for improvements in the rapid transit system, schools, water supplies, docks and various other muncipal services.

Of the $58,000,000 of bonds, $36,000,000, bearing interest at the rate of 4 per cent, and due from July 1, 1935, to 1945, were priced to yield 1.25 to 3.85 per cent, and $22,000,000 bearing coupons of 1½ to 3½ per cent for the various maturities ranging from July 1, 1935, to 1949, were priced to give the same yields.

PWA Announces Loans Made Possible by Further Rescissions

WITH the funds of the Public Works Administration virtually exhausted, allotments for non-federal projects now on the waiting list still continue, although at a slower rate, made possible by readjustments in existing allocations, revocation of allotments and requests of municipalities for changes from loans-and-grants to grants.

Among the new allotments announced is a loan and grant of $2,000,000 to Nashville, Tenn., for courthouse, a loan and grant of $1,825,000 to Westchester County, N. Y., for buildings, a loan and grant of $1,429,000 to Buffalo, N. Y., for storm sewers, and a grant of $1,192,000 to New York City for pier sheds.

Administrator Ickes also announces that several previous allotments have been reduced and corresponding increases have been made to other projects. For example, a loan and grant of $2,000,000 to Birmingham, Ala., for completion of series of projects including water supply lines, sewers and bridges was reduced to $1,360,000 as the result of changes in plans, which released the balance of $640,000 for reallotment.

An outstanding revocation of allotment was the rescinding of the $6,877,000 loan and grant for construction of the Chicago Outer Drive Bridge. Inability of the Lincoln Park commissioners to provide security for the loan resulted in this action, although the PWA had considered the project one of the most desirable in the non-federal classification. The rescinding of small allotments continues as the applicants fail to sign up for bond contracts or announce plans to abandon proposed improvements. A recent release from PWA headquarters indicates that the rescinding of 27 such allotments has made available about $2,000,000 for awarding to projects on the waiting list.

The request of municipalities to have allotments changed from loan-and-grants to straight grants also makes PWA funds available for wider distribution. The total changes in this classification to date amount to 238, which has released $28,716,000 for additional projects.

Chicago May Refuse Water to Delinquent Suburban Towns

In a written opinion by Corporation Counsel William H. Sexton, Chicago has a legal right to shut off the water supply of eight suburbs which have persistently refused to pay their bills. Approximately $600,000 is due the city of Chicago from Harvey, Cicero and other nearby villages. The city of Chicago is compelled by a Supreme Court decision to supply water to any suburb which builds mains to the city limits and asks for water. Chicago must sell the water at cost, though the suburbs may resell the water at any price they wish. Cicero owes Chicago $269,331 for water and Harvey has a back bill of $221,000. Other communities with unpaid bills ranking from $3,600 to $23,500 are Stickney, Summit, Elmwood Park, Burnham, Calumet Park and River Forest.

Army Engineers Preparing Report On Muskingum Project Dam Sites

A report covering the Muskingum Valley Conservancy District area which will contain recommendations for dams and reservoir sites from among the 30 proposed locations, is expected to be ready about August 1. This survey and report has been carried forward under the direction of the U. S. Engineer's district office at Zanesville, Ohio, in charge of Major J. D. Arthur, Jr., district engineer.

A comprehensive topographical and geological survey over the entire area has been made; a feature of the work is a complete aerial survey. The general features of the project which will provide for flood control and water conservation were outlined in *ENR*, June 21, 1934, p. 799. The original program included the construction of 14 dams.

Kentucky Highway Purchases Subject to 3 per cent Sales Tax

Purchases made by the Kentucky State Highway Commisson are subject to the 3 per cent state sales tax according to an opinion rendered to the commission by the state attorney general's office. According to members of the commission, the highway organization will be forced to pay about $100,000 of its revenues annually to the state in the form of this sales tax.

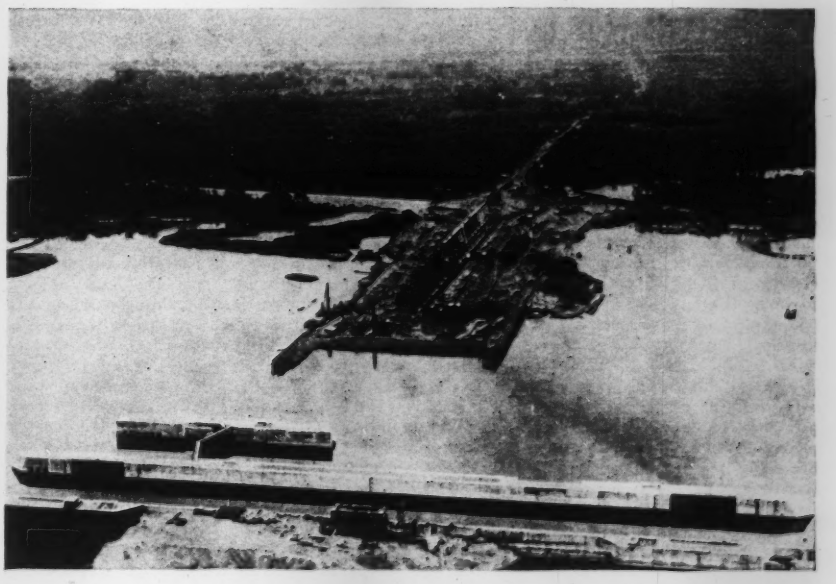
The opinion, prepared at the request of the commission, declared "that persons engaged in the various business enterprises made taxable under this (the sales tax) act will not be entitled to an exemption on account of any merchandise, equipment and supplies sold to the State Highway Commission". According to the attorney-general's office, the only exemptions in the act are to charitable and educational institutions while the federal government and various states and their political sub-divisions are exempt from paying the tax imposed on electric current, water and gas.

Jury Disagrees in Silicosis Suit Against Contractor

A jury disagreement ended the first case tried of some 250 silicosis suits filed in the Fayette County, W. Va., Circuit Court against Rinehart & Dennis Co., Inc., contractors of Charlottesville, Va. This is the second trial to end in a disagreement of the jury in suits filed against the same contractor. Last year the first of more than 300 suits to come to trial, ended similarly in the same court (*ENR* May 11, 1933, p. 603). Later nearly all of the suits were settled out of court (*ENR* Aug. 10, 1933, p. 181). A new group of plaintiffs are involved in the present suites. The Rinehart & Dennis Co. was contractor on a hydro-electric development built for the New-Kanawah Power Co., on the New River near Hawks Nest, W. Va. Included in the project was a pressure tunnel 3 miles long, varying in size from 31 ft. to 46 ft. inside diameter. The plaintiffs allege the contraction of silicosis while working in the tunnel. In the trial just ended the plaintiff was asking $50,000 damages.

LOCK AND DAM NO. 5 ON UPPER MISSISSIPPI CANALIZATION WORK

Lock and dam No. 5 at Whitman, Minn., about 100 miles south of Minneapolis, is one of the 27 units being built by the Corps of Engineers to provide a 9-ft. slackwater navigation channel on the Upper Mississipi River between St. Louis and the Twin Cities. The lock, in the foreground, described *ENR*, Jan., 1934, p. 101, was built by the E. F. Gillen Co., Milwaukee, and the dam is being constructed by Merritt-Chapman & Whitney Co. for a contract price of $1,792,200. The dam will be equipped with roller gates (*ENR*, March 29, 1934, p. 410). The improvement program outlined in *ENR*, March 8, 1934, p. 322, will ultimately cost about $124,000,000. Last week the PWA appropriated $17,000,000 for the continuation of this upper Mississippi River work during the next year.



Sixteen Chapters of Construction Code Have Been Approved

WITH the approval of Chapter XV of the Construction Code covering the Terrazzo and Mosaic Contractors Division of the construction Industry, a total of sixteen chapters have been approved, running consecutively from one through fifteen, then skipping to chapter twenty. Chapters XVI, XVII, XVIII and XIX, covering respectively Heating, Piping and Air Conditioning Contractors Division, Marble Contractors Division, Architects and Professional Engineers Divisions, are pending final approval. A chapter for the Building Granite Division covering quarrying and finishing of building granite is also nearing completion. Other chapters on which public hearings were previously held are the Stone Setting Contractors and the Construction News Service. A public hearing is slated on Aug. 3 for the proposed chapter for the Cork Insulation Contractors. The sub-chapters of the general contractors' divisional chapter for Building Contractors, Heavy Construction and Railroad Contractors and Highway Contractors are still pending approval.

Area agreements

Final approval has not yet been given to the first proposed area agreement governing the wages of bricklayers in Greater New York and part of Long Island. Many other applications for area agreements are pending. Three, in the painters division, have had public hearings: one for Dade County, Florida, was held in Miami on July 9; another for the Wilmington, Del., area, was held at Washington July 20; the third, for the Philadelphia area, was held at Washington July 24.

NRA has supplemented its instructions for effectuating area agreements (*ENR*, June 7, p. 752) with particular reference to approving representation on the part of groups representing employers and employees. It has made it the duty of those sponsoring the agreement to insure that all those affected by the agreement shall have a voice in making the agreement. Various methods are suggested, including open meetings, publicly advertised, for all interested parties. Notice is also given that the region to be covered by the agreement should be carefully and definitely bounded, so that the provisions of the agreement will be economically sound in all parts of the region.

Permits for 48-hr. week

The National Construction Planning and Adjustment Board in a preliminary circular dated July 23 sets forth instructions to govern applications for permission to work employees 48 hr. per week under the Construction Code. Requests for the circular and applications are to be sent to the offices of the board, 4823 Commerce Building, Washington, D. C.

The instructions refer to paragraphs (a) (b) and (c) of sub-section B-1, section 2 of Article III of Chapter I. Under these provisions the 40-hr. maximum week and 8-hr. day are relaxed after approval by the board, and an employee may be permitted to work 48 hr. in any one week when the following conditions obtain:

1—On projects located at points so remote and inaccessible that camps or floating plants are necessary for the housing or boarding of a majority of the labor employed.

2—On such remote projects, when working time has been lost because of inclement weather or unavoidable delays in any one week, it may be made up in the following four weeks.

3—On projects in localities where a sufficient amount of qualified labor is not available in the immediate vicinity of the work.

General Contractors Code Budget

Confusion has arisen over an error in a news item relating to code budgets in our July 5 issue, p. 24, in which it was stated that the table of fees there given applied to the general contractors division of the construction industry. That statement was incorrect. The published table was for the basis of contributions to the code authority for the construction industry. The budget for that code authority is $290,300, as correctly stated in our issue of July 12; the budget for the general contractors division is $2,750,200. The approved basis of contributions by members of that division to the expenses of its code authority is: "Not to exceed 1/10 of 1 per cent of the value of construction projects exceeding $2,000 in value."

New Hydraulic Model Basin Being Built at Berkeley

A hydraulic model testing basin primarily for studies on models in which tidal effects are predominent is in process of construction at the University of California under an agreement between the university and the U. S. War Department. The contract provides for cooperative usage by federal and university officials over a period of five years from the date of completion. The model basin will be 75 ft. long by 42 ft. wide and will be equipped with a tide distributor, wave machines, and water supply in addition to the tidal flow. Models will be of the movable bed type and the effect of the entire tidal prism will be represented by river labyrinths.

The basin will be part of a new outdoor laboratory for the department of mechanical engineering which is to include towing equipment for ship models, testing facilities for propeller pumps, and channels for studying the movement of bed load. Investigations in the new model basin will be under the direction of Lt.-Col. Thomas M. Robins, U. S. Division Engineer at San Francisco, with Lt. H. D. Rindlaub in active charge. Prof. Morrough P. O'Brien, of the university, will act in an advisory capacity.

Bids Called for $1,800,000 Postal Terminal at Montreal

Bids have been called by the Canadian government for the construction and equipping of a new postal terminal building at Montreal to cost $1,800,000. It will form an important addition to the general terminal facilities of that city. The site is adjacent to the main terminals of both the Canadian National and Canadian Pacific Railways, and future plans call for connecting the new postal terminal with the railroad terminals by means of small traffic tunnels to cost another $500,000.

Government to Plant 1000-Mile Tree-Belt As Experiment in Climate Control

A BELT of trees 100 miles wide and more than 1,000 miles long, reaching from Canada to Texas through the mid-western drought area, will be planted by the federal government as an experiment in climate control. This belt of forest shelter will be started at once by the U. S. Forest Service following an executive order by President Roosevelt which allocates $15,000,000 of emergency funds for initiation of the project. The tree planting program is intended to effect permanent benefits and protection in the Great Plains area and the territory to the east. The definite plans for the project were developed at the Great Lakes Experiment Station of the Forest Service. The total cost of the ultimate development is estimated at $75,000,000.

Beginning at the Canadian boundary the forest belt will extend through the Dakotas, Nebraska, Kansas, Oklahoma and into the Panhandle section of Texas. Plans contemplate the planting of trees on about 1,820,000 acres. The windbreaks, which will be 7 rods wide covering 14 acres per sq.mi., will extend in a north and south direction about one mile apart, over the 100-mile width of forest belt. The western border of this belt would follow approximately the line of 18-in. annual rainfall.

The locating and obtaining of land, its preparation, the building of fences and the gathering of seed will constitute the work to be undertaken during 1935, but planting on a major scale is scheduled for 1936 and will proceed at the rate of 180,000 acres per year with completion expected in 1944. The land would be acquired by the government through purchase, lease or cooperative agreements and the areas between the strips would remain in private ownership.

"This will be the largest project ever undertaken in this country to modify climatic and other agricultural conditions in an area that is now constantly harassed by winds and drought," said F. A. Silcox, chief of the Forest Service. "Man cannot change all the forces of weather, but he can modify his own surroundings. He can ameliorate the effects of weather on a large scale, just as he can around his own home. If the surface velocity of the wind over a wide area can be broken and decreased even slightly, soil will be held in place, the moisture of the soil can be conserved."

In undertaking the shelter-belt plan, the Forest Service has canvassed experience gained in Russia, Italy, and Hungary where shelter belts have been used extensively for many years. The effect has been to stabilize farming operations from year to year. Crops have been more successful in bad seasons in the protected areas, when farmers in areas not so protected have suffered serious losses.

Seattle to Continue Skagit River Power Development Program

TENTATIVE agreement has been reached by a majority group in the Seattle city council for a development program costing about $15,000,000 to complete the municipal power development program on the Skagit River. The plan contemplates dividing the work between improvements within the city and on the river about 100 miles to the northeast with men taken from direct relief rolls for part of the work.

The council plans, tentatively, to apply for a federal loan and grant, totaling $10,000,000 to be used for construction of a new transmission line from the Skagit River to Seattle, remodeling several power substations in Seattle, and the building of a flood control and storage dam at the Ruby Creek site on the upper Skagit River. It was also agreed to purchase and fabricate locally all steel for a new steel-tower transmission line between a new power plant to be built at Diablo on the Skagit River, and the old power plant at Gorge Creek.

Plans for the work

The adding of two stories to the partly completed City Light Building, estimated at a cost of about $304,000, is planned to provide work for men on the direct relief rolls of the city, and the Washington Emergency Relief Administration is to pay 65 per cent of the labor costs of this work to provide jobs for these unemployed.

It is the plan to build the two Diablo power plants estimated to cost $1,750,000, by contract with the workers drawn from outside the relief rolls. The installation of machinery and the building of the Diablo-Gorge Creek transmission line would be done by day labor, also drawn from outside relief rolls.

Houston Ship Channel Work Will Provide 32-ft. Depth

With the allotment of an additional $1,043,000 by the PWA for improvements to the Houston ship channel, a total of $2,543,000 is available for widening and deepening that waterway to a usable depth of 32 ft., according to Col. Edwin H. Marks, district engineer, U. S. Engineers, with headquarters at Galveston. Contractors will soon be requested to submit bids for this channel improvement work as provided under the recent allotment. At the present time three dredges are operating on the section between Bolivar Roads and a point five miles below Morgan's Point, which was the section to be improved under the original allotment of $1,500,000.

Distillery Spends $300,000 for Waste Disposal Plant

An expenditure of about $300,000 for evaporators, additional dryers, and housing, is being made by Hiram Walker & Sons, Inc., distillery at Peoria, Ill., for a new treatment plant to handle industrial waste. Construction of the treatment plant was agreed upon by the company, and approved by the state sanitary water board, after the board had denied the company's application to discharge untreated waste into the Illinois River. Untreated waste, it is estimated, would approximate that from a city of one million population.

The distillery, which has a rated capacity of 20,000 bushels per day, is to be operated on half-capacity schedule until the evaporating equipment is in service. The state board has ruled that the evaporating equipment must be under contract not later than September 1, and that the complete screening, evaporating and drying equipment shall be in operation not later than January 1, 1935.

Recently Elected President of A.S.T.M., W. H. Bassett, Dies

William H. Bassett, elected president of the American Society for Testing Materials on June 27 and metallurgical manager, American Brass Co., Waterbury, Conn., died at his home in Cheshire, Conn. on July 21. He was born in New Bedford, Mass., 66 years ago, and graduated from the Massachusetts Institute of Technology in 1891. Following several years work in the field of industrial chemistry, he became chief chemist and metallurgist of the American Brass Co. in 1903 and remained with the company to the time of his death. He was made technical superintendent and metallurgist in 1912 and appointed to position of metallurgical manager in 1930.

Mr. Bassett became a member of the A.S.T.M. in 1913 and had always been particularly active in the non-ferrous field. He was a member of the executive committee in 1916-18 and served as vice-president from 1932-34. He contributed much original research in the field of the non-ferrous industry and was responsible for much of the progress in the refining of copper and the extensive use of the spectroscope in metallurgy.

Cotton Mats Used for Curing Concrete Paving in Texas

Mats made of cotton are being used for curing concrete paving slabs on the construction of highways in Texas. At a recent meeting of the highway commission, at which construction contracts totaling $2,119,305 were awarded, the use of cotton mats for curing concrete on four of the larger projects was prescribed.

The new method, according to reports was given official approval following a series of experiments which indicated that it was superior, both in time and money, to burlap mats or the use of dirt and sand in curing concrete paving slabs. The bureau of public roads also has authorized the adoption of the cotton mats for curing, it was stated.

Benefits claimed for the use of this curing process include a reduction in the curing time from ten to six days, more effective insulating against the heat of the sun and an increase in the flexural strength of the finished slabs by about 13 per cent because of the more uniform moisture content during curing.

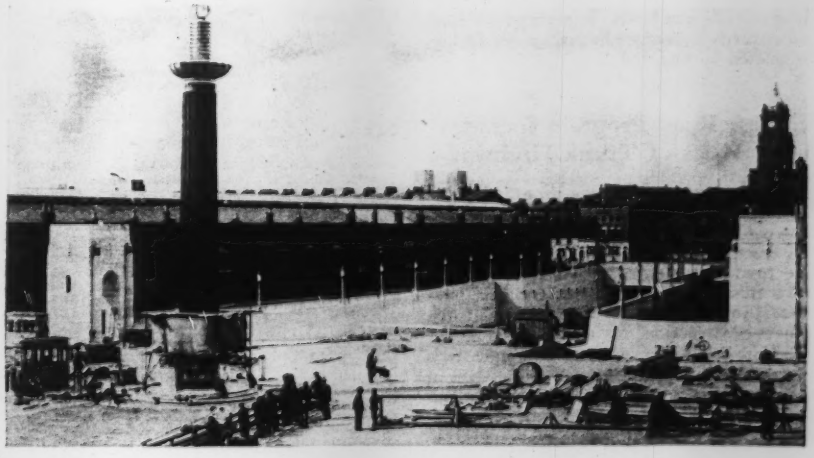
Up to the present time the mats are being manufactured in the East at comparatively low cost; one bale of cotton is required to produce mats for the curing of a mile of paving.

Filtration Plant Roof Collapse During Construction Kills Two

Collapse of a freshly poured concrete roof of the Victoria Park Filtration Plant at Toronto, Canada, according to reports, killed two workmen and injured eleven more. Officials indicated that work was temporarily shut down following the accident. Concrete placing on the 10-in. reinforced concrete slab was under way when the timber supports collapsed dropping tons of fresh concrete and the crew 20 ft.

MERSEY RIVER TUNNEL AT LIVERPOOL, ENGLAND, IS OPENED

The vehicular tunnel under the Mersey River between Liverpool and Birkenhead, England, was officially dedicated in the presence of King George and Queen Mary on July 18. The 5,274-ft. under-river portion of the tunnel is of circular section with an outside diameter of 46 ft. and a roadway width of 36 ft. A description of the tunnel appeared in *ENR*, Nov. 16, 1933, p. 581. The view shows the Birkenhead entrance approaching completion with the prominent pylon, which will serve as a beacon at night, the pay stations and the tops of the buildings which house the elaborate ventilating equipment in the center-background.



International Structural Engineering Program Planned

The Permanent Committee of the International Association for Bridge and Structural Engineering at its recent meeting in Stresa, Italy, made tentative plans for the program for the next international congress to be held in Rome in the spring of 1936. As at the Paris Congress of 1932, three half-day sessions are contemplated at which papers on structural steel and reinforced concrete will be presented.

For structural steel work, the subject chosen for the first theme was the importance of the toughness of steel in calculating and dimensioning structures. A half day will be devoted to practical questions in connection with structural welding, including such phases as the influence of dynamic loading, inspection and elimination of changes in shape caused by heat. The third phase of steel work to be considered will cover theory and experimental research.

Stresses and factors of safety in reinforced concrete and the influence of continuous loading as well as consideration of means of increasing the tensile strength and reducing cracking of concrete will be considered at one session. Hydraulic structures of concrete will comprise the subject of the third day's discussions.

At the meeting of the Permanent Committee the "Final Report" of the Paris Congress and the second volume of the "Publications" issued by the Association were submitted in financial form. They may be obtained from the office of the secretary, Swiss Federal Institute of Technology, Zurich, Switzerland.

Mexico Rushing Completion of Highway South From Rio Grande

In a final effort to complete the trunk highway between the Rio Grande River crossing at Laredo, Texas, and Mexico City, so that Mexico may receive the benefits of American automobile tourists as soon as possible, the force of laborers has been increased to approximately twelve thousand by the Mexican government. Of this number more than eight thousand are employed in constructing the section between Imiquilpan and Montemorelos. On this stretch of highway 2,550 dump trucks of American make, eight power shovels and eight graders are at work. Rapid progress is being made in hard-surfacing other sections of the road. It is planned to have the entire highway, including surfacing, completed by October 1.

Chinese Road Program Includes 5,600 Miles of Trunk Highway

For the current year, the program of the Bureau of Public Roads, National Economic Council of China, provides for the construction of about 3,100 miles of trunk line roads by various provinces which receive funds from the bureau for this purpose. In addition it will undertake the direct construction of about 2,500 miles of main highways in the Northwestern Provinces. This bureau was established in 1932, and during the past two years about 2,500 miles have been built with its financial aid and under its supervision.

PWA Rushes Work to Get Non-Federal Projects Started

THE PWA is rushing the work of getting out bond contracts and grant agreements to cover the advance of funds under the 1,510 non-federal allotments that have been made since the new appropriation of public works money became available less than a month ago. These new allotments total more than $236,000,000 and are estimated to provide more than 1,000,000 man-months of direct employment on construction work the country over.

Contracts and grant agreements for 325 of these new allotments have already been dispatched from Washington. The allotments covered by these contracts and agreements total $27,237,853, and the projects which will be constructed are estimated to cost $74,777,594. The difference between these figures is accounted for by the fact that many of the allotments are for 30 per cent grants only.

The speed with which the 325 contracts have been prepared indicates the present efficiency of the PWA organization compared to its functioning a year ago when it took from July until November to get out the first 200 contracts and agreements covering non-federal allotments made from the original appropriation.

All of the recipients of the new allotments have promised that if their applications were granted, they would put men to work promptly, and the PWA intends to place them in a position where their promises can be fulfilled. If they fail to execute contracts and agreements with reasonable promptness, the allotments will be rescinded and the money re-allotted to some of the thousands of applications still left on the waiting list.

List of allotments

A tabulation of the 1,510 non-federal allotments, giving the location, type of project and amount of loan and grant, has been carried forward in the last two issues (July 12, p. 62, and July 19, p. 94), and a further installment of this list is presented in this third tabulation:

KEY TO SYMBOLS

*-grant only	
m-meters	c-canal
p-pumps	dm-dam
t-tank or standpipe	r-reservoir
f-filtration	t-treatment plant
d-distr. supt.	b-building
w-well	i-iron removal
s-supply	pw-power line
g-generator	sf-softening
ch-chlorinators	bl-boilers

Schools

Broome Co., N. Y. (Cincinnatus)	214,500
Brown Co., Tex. (Bangs Ind. Sch. Dist)	12,300
Cambria Co., Pa.	20,000
Camillus, N. Y.	28,500
Camillus, N. Y.	142,200
Canadian Co., Okla.	8,500
Carmel, N. Y. (Lake Mahopac)	370,000
Castile, N. Y.	85,000
Champaign Co., Ill. (Urbana)	195,000
Chatham, Morris Co., N. J.	386,000
Chenango Co., N. Y. (So. Otselic)	121,000
Chico, Tex.	18,000
Clayton Co., Ga.	5,000
Colchester, Vt.	1,000*
Colonie, N. Y. (Londonville)	26,000
Corinth, N. Y.	225,000
Cortland Co., N. Y.	125,000
Cortland Co., N. Y.	145,000
Cortlandt, N. Y.	75,000
Cranston, R. I.	413,000
Crawford Co., Ill.	111,500
Culberson, Tex.	15,500
Delaware Co., Pa.	14,500*
Delaware Co., Pa.	72,500*
Denton, Tex. (St. Teacher's Coll.)	216,000
Denton, Tex. (St. Coll. for Women)	265,000
De Witt Co., Ill.	90,000
Dracut, Mass.	17,500*
Dudley, Mass.	60,000
Duncan, Okla.	101,000
Dunklin Co., Mo.	19,550
Duvall Co., Tex.	86,000
Elmore Co., Ala.	162,000
Essex, N. Y. (Schroon)	289,500
Fairforest, S. C.	30,000
Fort Bend Co., Tex.	4,500*
Freestone Co., Tex.	22,000
Fresno Co., Calif.	43,500*
Greenburgh, N. Y. (Ardsley)	100,000
Greene Co., N. Y.	400,000
Guilderland, Albany Co., N. Y.	20,000
Hardin Co., Tex.	64,000
Healdsburg, Calif.	60,000
Hempstead, N. Y.	167,500
Hempstead, N. Y. (Merrick)	185,000
Hempstead, N. Y.	251,800
Henderson, Tex. (Rusk Co.)	154,000
Holbrook, Mass.	45,000
Howard Co., Neb. (Elba)	15,000*
Indiahoma, Okla.	21,500
Iva, S. C., Anderson Co.	56,500
Jackson, Tenn. (also park)	69,500
Jefferson Co., Ala.	260,000
Juneau, Wis.	26,500*
Kalamazoo Co., Mich.	55,500
Kankauna, Wis.	65,400
Kansas City, Kan.	557,000*
Kaufman Co., Tex.	70,000
Kearney, Neb.	7,000*
Kearney, Neb.	18,000*
Kern County, Calif.	16,500*
Kern Co., Calif. (Bakersfield)	300,000
Kohler, Wis.	200,000
La Canada Pub. Sch. Dist., Los Angeles Co., Calif.	21,000
Lackawanna, N. Y.	72,000
Lafayette Co., Mo.	1,300*
Lafourche Parrish, La.	73,000
Lake County, Ill.	5,500*
Lancaster Co., Neb.	5,500*
Lansingburgh, N. Y. (Troy)	450,000
Le Grand, Calif.	7,200*
Leonardsville, N. Y. (town of Brookfield)	119,500
Lime, N. Y.	102,800
Limestone Co., Tex.	8,000
Livingston, Tex. (Polk Co.)	66,000
Livingston Parish, La.	32,700
Long Beach, Calif.	10,200
Long Beach, Calif.	27,000
Long Beach, Calif.	196,000
Long Beach, Calif.	402,700
Machias, N. Y.	72,000
Madera Co., Calif.	2,400*
Madison Co., Ill.	18,400*
Manchester, N. H.	75,000
Manchester, N. H.	165,000
Markham, Tex.	12,200*
McHenry County, Ill.	8,000
Meriden, Conn.	75,000
Milwaukee Co., Wis. (Shorewood)	70,300*
Mirando Sch. Dist., Tex., Webb Co.	19,500
Montpelier, Vt. (boilers)	1,300*
Moore Co., N. C.	222,500
Moreau, N. Y.	200,000
Mountain Lake, Morris Co., N. J.	254,000
Nashville, Tenn.	2,000,000
Nassau County, N. Y. (Floral Park)	345,000
New Madrid Co., Mo.	13,950
Newport, R. I.	97,100*
New Providence, N. J.	85,000
Newton, Kan.	63,500
Noridgewock, Somerset Co., Maine	12,000
Olean, N. Y.	815,000
Oneida Co., N. Y. (Remsen)	196,000
Otoe Co., Neb. (Palmyra)	11,000*
Otsego Co., N. Y. (Gilbertsville)	137,000
Otsego Co., N. Y. (Mt. Upton)	81,000
Palo Alto Co., Iowa	32,500
Paris, Mo.	64,300
Pattonville, Mo.	28,000
Pierce Co., N. D.	6,900
Polk Co., Tex.	14,400*
Portland, N. D. (Traill Co.)	53,000
Port Lavaca, Tex.	45,000
Portola El. Sch. Dist., Plumas Co., Calif.	27,000
Providence, R. I.	3,000,000
Putnam Co., N. Y.	7,000
Red Bank, N. J.	215,300
Rensselaer Co., N. Y. (Sandlake)	39,600
Republic Co., Kan. (Scandia)	25,500
Ridgefield, N. J.	67,000
Ridgeville, S. C.	28,000
Riverside, Calif.	14,000*
R. I. Emergency Pub. Wks. Corp., Providence, R. I. (sprinkler system)	3,600*
Roaring Springs, Tex.	46,700
Rock Hill, S. C.	128,000
Rockingham Co., N. C. (Reidsville)	51,000*
Rock Island Co., Ill. (Silvis)	28,000
Rockport, Tex.	50,000
Rolla, Mo.	70,000
Roseville, Calif.	96,000
Royse, Ind. Sch. Dist., Tex. (Rockwall, Collin and Hunt Cos.)	4,500*
Rumson, N. J.	196,000
Rutland, Vt.	3,000*
Rutland Co., Vt.	3,100*
St. Louis, Mo.	2,000,000
St. Louis Co., Mo.	16,500
Salem Co., N. J.	315,000
Salinas, Calif.	3,000*
Sam Houston State Teachers' College, Huntsville, Tex.	150,000
San Bernardino, Calif.	350,000
Sangamon, Co. Ill.	25,000
San Juan, Puerto Rico	321,000
San Mateo, Calif.	34,900*

Saratoga Sch. Dist., Ark., McNab..	4,000
School Dist. No. 115, Bond and Clinton Cos., Ill.	13,000*
Scott and Newton County, Miss.	20,000
Sheboygan, Wis.	13,300
Shelby Co., Ala.	46,500
Sherman Co., Kan.	175,000
Silsbee, Tex., Hardin Co.	24,000
Sioux Falls, S. D.	803,000
Smith Co., Tex.	52,600
Smith Co., Tex.	58,800
Somerset Co., N. J.	245,000
Sonoma Co., Calif., Sebastopol	278,000
Sonora Ind. Sch. Dist., Sutton Co., Tex.	28,100
Sparta, Sussex Co., N. J.	130,000
State of Neb., Penn.	5,500*
State of Vermont (Burlington)	287,000
Sycamore, Ill.	125,000
Tewksbury, Mass.	32,400*
Thompson, N. Y. (Monticello)	337,000
Tipton, Mo.	$40,700
Trinidad, Tex.	32,000
Tupper Lake, N. Y.	300,000
Union, N. Y.	500,000
Urbana, N. Y. (Hammondsport)	119,488
Wake Co., N. C.	35,000
Waldoboro, Me.	33,300
Waltham, Mass.	72,300*
Walton, N. Y.	145,000
Watertown, Mass.	135,000
Wawarsing, N. Y. (Ellenville)	109,000
Wayne, N. J.	300,000
Westchester Co., N. Y. (Yorktown Heights)	310,000
Westminster, Mass.	12,300*
Westport, Conn.	85,300*
Wheaton, Mo.	6,700*
White Co., Ill.	25,700
Whittenburg, Tex. (Hutchinson Co.)	71,000
Witchita, Co., Kan.	15,000
Wilson, N. Y.	220,000
Wilson, N. C.	40,000
Woodford Co., Ill.	3,600*
Woodford Co., Ill.	24,000

Buildings

Bar Harbor, Me.	$15,000
Baton Rouge, La.	50,000
Bosque Co., Tex.	45,500
Bosworth, Mo.	8,000
Brentwood, Mo.	28,600
Bristol, R. I.	3,000*
Bruceton, Tenn.	21,500
Buffalo, N. Y.	500,000
Carroll Co., Mo.	48,500
Charlotte, N. C.	27,300
Columbia, S. Car.	33,200*
Columbia, Tenn.	60,000
Commonwealth of Massachusetts, Northampton	22,800*
Commonwealth of Mass., Westborough State Hospital	14,000*
Cranston, R. I.	50,000
Dade County, Mo.	111,100
Des Moines, Iowa	61,500*
El Paso Co., Tex.	69,000
Fairfield, Conn.	131,000
Fresno, Calif.	115,000*
Fresno, Calif.	120,000*
Haverhill, Mass.	35,400*
Hope, N. D.	17,500
Hydro, Okla.	8,800
Jefferson City, Mo.	7,500*
Jefferson City, Mo.	13,500*
Jefferson Co., Mo. (Hillsboro)	275,000
Joplin, Mo.	34,200
Kendall Co., Tex. (Boerne)	10,000
Knox, Mo.	80,000
Knox County, Tex. (Benjamin)	100,000
Laconia, N. H.	164,000
LaCrosse Co., Wisc.	100,000*
Louisville, Ky.	18,900*
Madera, Calif.	27,800*
Madison, S. D.	9,900
Marshall, Ala.	70,000
Middlesex Co., N. J.	575,000
Miner Co., S. D.	98,300
Mitchell, S. D.	12,900
Mitchell, S. D.	175,000
Modesto, Calif.	3,000*
Monterey, Calif.	24,400*
Morehouse Parish, La. (Bostrop)	36,800
Nashville, Tenn.	150,000
Nassau Co., N. Y.	50,000
Norman, Okla.	50,000
Oneida Co., N. Y.	248,000
Ontario, Calif.	61,000
Pine Bluff, Ark. (State A&M&Normal School)	65,000
Piqua, Miami Co., Ohio	25,000
Pittsburgh, Pa.	71,000*
Quanah, Tex.	80,000
Quincy, Mass.	143,500
Richmond, Mo.	22,900
Ripon, Wisc.	17,000*
R. I. Emergency Public Works Corp., Kingston, R. I.	2,000*
Kingston, R. I. (Sprinklers)	7,800*
Kingston, R. I.	25,400*
Kingston, R. I.	45,000*
Kingston, R. I.	51,600*
Kingston, R. I.	69,400*
Kingston, R. I.	84,800*
Kingston, R. I.	14,900*
Providence, R. I.	32,200*
Roanoke Rapids, N. C.	32,000
Rockdale Co., Ga.	1,800*
Rutland, Vt.	8,500*
St. Louis, Mo.	552,500*
Santa Cruz, Calif.	18,600*
Santa Rosa, Calif., (Sonoma Co.)	29,300*
Saratoga Co., N. Y.	250,000
Saugus, Mass.	65,000
Schenectady, N. Y.	55,000
Schenectady, N. Y.	436,000
Sioux Falls, S. D.	317,000
State of Calif. Camarillo St. Hosp.	
Ventura Co.	184,000*
State of Nebraska, Ingleside	4,600*
State of N. J., Bordentown	539,100
State of N. J., Jamesburg	43,000
State of N. J., Jersey City	294,500
State of N. J., New Lisbon	591,000
State of N. J., Rahway	58,000
State of S. Dak., Vermillion	25,500*
Summers Co., W. Va.	51,000
Tifton, Ga.	14,200
Topeka, Kans.	36,500
Trinity Co., Calif. (Weaverville)	9,800*
Tyler, Tex.	187,300
Vilas Co., Wisc. (Eagle River)	14,300
Watertown, Mass.	35,000
Webster, La.	19,000
Yorktown, N. Y.	37,000

Miscellaneous

Amesbury, Mass., sidewalks	$6,800
Brookings, S. D., swimming pool	28,000
Canadian, Co., Okla., drainage	12,000
Carson, N. M., irrigation	48,000
Carthage, Mo., swimming pool	18,500*
Charlotte, N. C., fire drill towers	17,500
Commonwealth of Mass., Grafton St. Hospital, sprinkler system	14,000*
Elroy, Wisc., street lighting	5,750
Fayetteville, N. C., river and r.r. terminal	87,500
Federal, N. C., electric distribution system	35,000
Fort Collins, Colo., irrigation	24,100*
Galveston Co., Tex., sea wall	127,900
Grass Valley, Calif., irrigation	15,300*
Herington, Kans., (transformer)	3,500*
Hidalgo Co., Tex., (Mission) irrigation	557,000
Hidalgo Co., Tex., San Juan, irrigation canals	1,769,000
Houston, Tex., gas distribution system	92,300
Kennebunk Port, Me., curbing and sidewalks	14,300
Lancaster Co., Nebr., flood relief	60,000*
Las Animas, Colo., irrigation, r-dm-e-tun	555,000
Lenoir, N. Car., fire system	26,000
Lindsay, Okla, street lighting	1,000*
Madison, S. D., swimming pool	16,300
Maverick Co., Tex., irrigation canals	2,422,000
Modesto Irrig. Dist., Stanislaus Co., Calif., canals and elect. trans. line	225,000
Morehead, Miss., swimming pool	5,800
Morehead, N. C., wharf	425,000
Nashville, Tenn., paving, buildings, gen'l mun. impvts	440,000
Oakland, Calif., port improvement, wharf, wall, r.r. track	151,000*
Orange Co., Tex., drainage	378,000
Orange Co., irrigation p-e	489,000*
Palacios, Tex., sea wall	141,000
Pecos, N. M., irrigation (plugging wells)	75,000
Rhode Island Emergency Pub. Wks. Corp., Port Judith Pond, port improvement, jetties, dredging, docks, dikes	74,000*
Rockville Centre, N. Y., fire alarm system	65,000
Salem, S. D., swimming pool	13,300
San Mateo Co., Calif., wharf and port facilities	403,000
Santa Barbara, Calif., sea wall (also building)	375,000
Santa Clara, Calif., water conservation	673,000*
Sioux Falls, S. D., parks	42,500
State of N. J. (Greystone Park) steam line	46,000
State of N. J., Skillman, steam conduit	37,700
State of N. Car., school buses	122,400*
State of Wisc., Madison, tower	11,600*
Tarrant Co., Tex., levees	315,000
Watertown, Mass., sidewalks	20,000
Wauwatosa, Wisc., swimming pool	21,500

(To be continued)

Brief News

THE LADNER BRIDGE CO. has been given an extension of time to submit plans to the British Columbia government for a bridge across the Fraser River at Ladner, B. C., Canada. The Fraser River Bridge Co. also holds a charter for a bridge a few miles further up the river at New Westminster and this company has also failed to submit plans to the government for the structure.

THE IMPROVEMENTS proposed by the Dallas, Texas, waterworks system, estimated to have cost $840,000, will probably be abandoned because water department revenues cannot be pledged to repay a loan of $640,000 from the PWA. The ruling of the city legal department against the pledging of these revenues and the inability of the city to secure the loan in any other way probably will necessitate the postponing of the program, according to City Manager John N. Edy.

THE CODE AUTHORITY for General Contractors has established a state administrative agency for Illinois with headquarters at Room 1819 Conway Building, Chicago. Registration of construction work in Illinois is made through this agency.

PLANS for a large industrial center and ship terminal near the mouth of the Merrimac River opposite Newburyport, Mass., have been placed before the Massachusetts Department of Public Works. The proposal involves about 850 acres of land along the river with 24 warehouses. License was requested to build five piers.

DETERIORATION of the sewer line in Oklahoma City, Okla., leading from the packing house district, results from the presence of hydrogen sulphide gas, according to the results of a survey by city and packing plant engineers. Gas results from the high sulphate content of the city water, sewage from the plant and the seepage of oil waste into the sewer system.

A SPECIAL ELECTION at Batavia, N. Y., in August will permit citizens to vote on a proposal to build a 1,500,000 gal. water storage tank to cost about $100,000.

THE VALIDITY of $10,000,000 of Missouri state bonds to be used for construction of state buildings will be tested in a friendly suit instituted in the state supreme court to clear up all possible obstacles to the validity of the bond issue.

NIAGARA FALLS, N. Y. announced that construction for the first half of 1934 has exceeded the total building done in the city during the whole of 1933. Residential and industrial construction from January to June this year totaled $471,000 while for all of 1933, it was only $450,000. However, even if the present rate is maintained for the balance of the year, the total will be considerably less than during peak years.

THE ARMY ENGINEER'S office at Louisville has started dredging operations which will lower the level of the Ohio River dike, which extends out in the river toward Madison from the Kentucky shore, an average of five feet. The dike is considered an obstruction to navigation and no longer is used to land boats at Madison, Ind. It was built about 1892 to throw the current of the water toward the Indiana shore to enable boats to land at Madison during times when the river was at a low stage.

ACQUISITION OF PROPERTY for the Fourteenth Street grade elimination work costing $175,537 has been completed by Louisville, Ky. The delay in getting the work started has been caused, according to reports, by the inability of the Pennsylvania Railroad to obtain money for the large capital outlay, estimated at $1,500,000 for the whole job. The city has funds for starting the work secured from the sale of grade bonds authorized about eight years ago. The cost of the work is prorated so that the railroad pays 65 per cent and the city 35 per cent.

THE BOND COMMISSIONER of Oklahoma approved 28 bond issues during June, which is four times the number approved during the corresponding month in 1933. Fourteen of the issues provide $966,000 for buildings and various construction work.

A FLOOD CONTROL commission for the Passaic River valley in New Jersey has

been organized under authorization of the state legislature. George Hewitt of Paterson has been named engineer. Flood damage along the river frequently is high, due to the fact that it flows through the populous metropolitan district of Northern New Jersey.

Obituary

ALFRED H. TITUS, contractor and builder, of Lynn, Mass., died on July 20 at the age of 51.

FRED B. HORTON, contractor for public buildings, died in Buttonwoods, R. I., on July 23.

WILLIAM J. WOODS, president and treasurer of Samuel H. Pitcher Co., Inc., engineers and architects, Worcester, Mass., died at his home in that city, July 17, at the age of 70.

FRANKLIN A. CHAPMAN, retired civil engineer of New York City, died at East Hampton, N. Y., July 22, at the age of 77. He graduated from Rutgers University in 1880.

IRA T. REDFERN, for the last 25 years city engineer of South Orange, N. J., died in that city July 20 at the age of 55.

ROBERT G. NEUSTADT, construction engineer, died in Montecito, Calif., at the age of 49. He was a graduate of Princeton University in 1909.

CHARLES R. CAMPBELL, highway contractor of Renton, Wash., died at his home in that city at the age of 63. He had handled much of the street and highway paving in the county for the past 35 years.

CHARLES S. ALLEN, 49, New Hartford, N. Y., engineer in the state highway department, died suddenly at his home July 17. Mr. Allen was a graduate of the Polytechnic Institute, Troy, N. Y.

HARRY A. COOKE, chairman of the Worcester County Commissioners, Mass., former commissioner of buildings at Worcester, died in that city July 17 at the age of 58. He was CWA administrator for Worcester County at the time of his death.

FRANK W. ORMSBY, 77, Oswego, N. Y., formerly city engineer and for many years superintendent of the water works, died at his home in that city July 22. He was a graduate of Cornell University in 1878. After retiring from the office of city engineer Mr. Ormbsy engaged in private practice, specializing in hydraulic engineering, and was frequently employed by power compaies in water-rights litigation.

WILLIAM A. ANDERSON, lieutenant-colonel, Corps of Engineers, headquarters of the Third Corps Area, died in Baltimore July 16. He was 53 years old, graduating from the Military Academy in 1904. He had spent all of his service in the Engineers Corps, stationed in various sections of the United States and Panama. From 1924 to 1928 he was assistant commandant and commandant of the engineering school. From August, 1921, to September, 1922, he was consulting engineer to the New York Transit Commission.

CONSTRUCTION STATISTICS OF THE WEEK

ENGINEERING awards total $29,481,000 of which $26,000,000 is for public work and $3,481,000 for private. This total is 20 per cent over the average week to date for the year and 140 per cent over the average July week last year. Of the public work $26,000,000 is for state and municipal and $3,077,000 for federal improvements.

Waterworks at $8,451,000 registers the high week for the year, highway awards are up to $7,474,000 and other classes of work are about at their average weekly totals.

Large awards this week include: factory for U. S. Gypsum Company at Greenville, Miss., $600,000; apartment house for Prudential Life Insurance Co. in Newark, N. J., at $1,000,000; state hospital, Benton, Ark., $1,476,000; highway lettings by Kentucky, $945,000, Missouri, $603,000, New York, $554,000; street improvements by day labor at St. Louis, $1,050,000; state highway bridge over Sacramento River on M St., Sacramento, Calif., $907,000; the Mono Basin development by day labor, Los Angeles, Calif., $7,500,000; and cut-off wall, Fort Peck Dam, Montana, $2,200,000.

New capital for the week includes the highest municipal bond sales total this year, $37,915,000, of which $34,465,000 is in New York City bonds for construction purposes. Additonal PWA allotments for non-federal work total $28,211,000. This brings the cumulative total for this year to $866,499,000.

CONTRACTS

(Thousands of Dollars)

	Weekly Average July 1933	Week Prev. 4 Weeks	July 26 1934
Federal Government	$632	$11,385	$3,077
State and municipal	5,704	13,379	22,923
Total public	$6,336	$24,764	$26,000
Total private	6,261	5,379	3,481
Week's total	$12,598	$30,143	$29,481
Cumulative to date:			
1933 $495,998		1934 $748,974	

NEW PRODUCTIVE CAPITAL

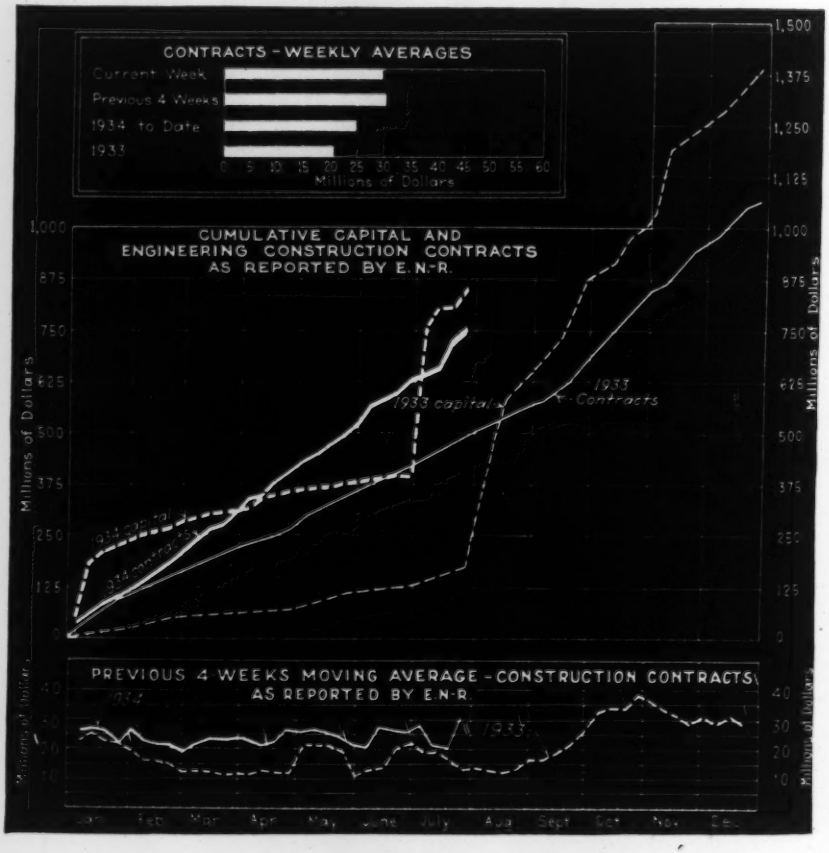
(Thousands of Dollars)

1934	Week July 26	Cumulative
State and municipal	$37,915	$208,087
PWA allotments, S&M	28,211	577,214
RFC loans, S&M	50	9,463
Corporate issues		17,063
PWA allotments, private	—1,115	54,672
Total, Non Federal	$65,061	$866,499
PWA allotments Federal Constr.	—1,045	180,442
Total new capital	$64,016	$1,046,941
Cumulative to date:		
1933 $183,351		1934 $866,499

NOTE: These figures include private bonds, and stocks sold for productive purposes; state and municipal bonds for construction; PWA loans and grants to states and municipalities, including the special highway funds; PWA private loans, and allotments for Federal construction.

INDEX NUMBER

E.N.-R.-Cost	1913 = 100	1926 = 100	E.N.-R.-Volume	1913 = 100	1926 = 100
July, 1934	199.65	95.97	June, 1934	119	50
June, 1934	199.61	95.95	May, 1934	101	44
July, 1933	165.50	79.56	June, 1933	109	48
1933 (Av.)	170.18	81.80	1933 (Av.)	102	45
1932 (Av.)	156.97	75.45	1932 (Av.)	127	56
1931 (Av.)	181.35	87.17	1931 (Av.)	220	96.5


CONTRACTS - WEEKLY AVERAGES
Current Week
Previous 4 Weeks
1934 to Date
1933
Millions of Dollars
CUMULATIVE CAPITAL AND ENGINEERING CONSTRUCTION CONTRACTS AS REPORTED BY E.N.-R.
Millions of Dollars
1933 capital
1933 Contracts
1934 capital
1934 Contracts
PREVIOUS 4 WEEKS MOVING AVERAGE - CONSTRUCTION CONTRACTS AS REPORTED BY E.N-R
1933
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec

CONSTRUCTION REPORTS

WATERWORKS

PROPOSED WORK

Calif., Maxwell—Maxwell Utility Dist. and Supervs. Colusa Co. authorize survey for water and sewerage systems in Maxwell Dist. Plans to secure P.W.A. aid. Noted Dec. 21.

Calif., Redding—City defeated $260,000 bonds to purchase and improve water supply system owned by California Service Co. City Council will now take steps to construct own municipal water system. Noted May 24.

Calif., San Bernardino—City, plans changing 11,400 water services average length of 40 ft., from galvanized iron to copper pipe, size to be increased from ¾ to 1 in. B. Livingstone, water supt. J. W. Catick, pres. Bd. Water Comrs.

Calif., San Francisco—F. Taylor, secy. P. Utilities Comn., City Hall, rejected bids laying University Mound Pipe line extension in Potrero Ave. from 25th St. to Brannin St., W.D. 62. Will readvertise. Noted June 28.

Idaho, Sandpoint—City plans constructing gravity supply line. $68,000. P.W.A. loan granted. Noted Jan. 25.

Ill., Forest—City bids in October or November, 50,000 gal. tank on 100 ft. tower, one 30 in. gravel packed well with rotary pump, about 120 ft down, 3,400 ft. 8 in. and 2,000 ft. 4 in. c.i. watermains, 5 new fire hydrants, etc. $32,000 grant and loan allotted by P.W.A. Warren & Van Praag, Inc., 415-18 Millikin Bldg., Decatur, engrs. Noted July 12.

Ill., Greenfield—City bids about October or November, waterworks and distribution system, $66,000 grant and loan allotted by P.W.A. Warren & Van Praag, Inc., 415-418 Millikin Bldg., Decatur, engrs. Noted July 19.

Kan., Mound Valley—City plans waterworks. $75,000. P.W.A. approved loan and grant.

Kan., Sedan—Black & Veatch, engrs., 700 Mutual Bldg., Kansas City, Mo., returned all bids July 6, for waterworks system, for City. Will readvertise.

Kan., Shawnee—Shawnee Twp. making plans constructing pipe line from Turner, south to Kanview, Crestline, Garden and Kinney Heights. $215,000. Chas. A. Haskins & Co., 517 Finance Bldg., Kansas City, Mo., engrs.

Mo., Bland—City plans waterworks system and sewers. $44,500 and $25,500 grant and loan allotted by P.W.A. for respective work. G. E. Wells, Inc., Security Bldg., St. Louis, engrs. Noted May 17.

Mo., Bolivar—City plans waterworks. $34,000 grant and loan allotted by P.W.A. E. T. Archer & Co., 609 New England Bldg., Kansas City, engrs. (**Correction**—amount of P.W.A. loan). Noted July 5.

Mo., Memphis—City soon takes bids water filtration plant with auxiliary piping, connections, etc., $12,000 allotted by P.W.A.; improving lighting plant, $27,650; P.W.A. allotted $8,500. W. B. Rollins & Co., 339 Railway Exch. Bldg., Kansas City, engrs. Noted July 19.

Mo., Paris—City soon takes bids improving waterworks and distribution system. $12,100. $3,400 grant allotted by P.W.A. W. B. Rollins & Co., 339 Railway Exch., St. Louis, engrs. Noted Mar. 22.

Mo., Perry—City soon takes bids waterworks and distribution system. $56,000 grant and loan allotted by P.W.A. W. B. Rollins & Co., 339 Railway Exch., Kansas City, engrs. Noted July 19.

Nev., Fallon—City Council rejected bids 1 m.g. reservoir.

N. J., Chester—Boro bids end of August, waterworks. $56,000. G. W. Knight, 38 Park St., Newark, engr. Noted July 19.

N. J., New Brunswick—City plans water supply system. $25,500. P.W.A. project. A. Atkinson, city engr.

N. J., South Amboy—City plans filter reservoir, pipe lines, pumps, etc. in Sayreville. P.W.A. project. A. J. McMichael, Post Office Bldg., engr.

North Carolina—Carolina Mountain Co-Operatives, L. W. Arthur, mgr., Banner Elk, plan 1 mi. 2 in. pipe line at cannery on Green Mountain Side of Toe River, Yancey and Mitchell Counties. Pipe will be encased.

O., Clyde—City making plans water filtration and softening plant, incl. dam, reservoir and filter plant. Council voted $142,000 bonds. Geo. Champe & Associates, Nicholas Bldg., Toledo, engr.

O., Groveport—Village, election Aug. 14, $15,000 waterworks system. P.W.A. project. Noted Sept. 7.

O., Hamilton—City Manager did not receive bids July 12, for Contr. 4, water supply, softening and filtration plant and appurtenances on land owned by city in Sects. 21, 28, T2n, R3, St. Clair Twp., Butler Co., and power transmission line from said plant to Hamilton municipal electric plant. $310,000. Will readvertise. P.W.A. project. Barstow & Le Febre, 31 North Summit St., Akron, engrs. Noted June 28.

S. C., Pendleton—City plans waterworks, $52,000. P.W.A. loan approved. Harwood Beebe Co., Spartanburg, engrs.

S. D., Beresford—City plans iron removal plant, 50,000 gal. clear water storage reservoir, $19,000 loan and grant allotted by P.W.A. J. M. Emberg, city engr. Nixon & Reynolds, 309 Grain Exch. Bldg., Omaha, Neb., consult. engrs. Noted Nov. 2.

Tex., Anna—City plans waterworks, $22,000 P.W.A. allotment approved. E. L. Dayton, Dallas Bank & Trust Co., Dallas, engrs. Noted Oct. 12.

Tex., Avery—City, c/o W. M. Bryan, plans waterworks system, improvements, incl. storage and distribution system, elevated tank, well. P.W.A. approved $21,100 allotment. D. C. Walmsley, Thompson Bldg., Dallas, engr. Noted Dec. 28.

Tex., Big Sandy—City, J. A. Mings, mayor, soon takes bids complete waterworks and sewerage system. $63,000. P.W.A. allotment approved. Hawley, Freese & Nichols, Capps Bldg., Fort Worth, engrs. Noted Jan. 18.

Tex., Dallas—City, c/o J. N. Edy, mgr., plans filtration and distribution system improvements. P.W.A. approved $840,000 allotment. J. B. Winder, Dallas, engr.

Tex., Dawson—City, c/o W. P. Johnson, mayor, plans waterworks extension, incl. new reservoir, new pumps, supply mains and fire hydrants. P.W.A. approved $54,000 allotment. A. F. Mitchell, Dawson, engr.

Tex., Dodsonville—City, c/o J. B. Deake, Box 906, Wellington, plans waterworks. P.W.A. approved $52,000 allotment. J. H. Gehbauer, Canadian, and Box 221, Higgins, engr. Noted Feb. 15.

Tex., Elkhart—City, c/o J. B. Parker, mayor, plans water and sewerage system. P.W.A. approved $42,000 allotment. J. Rady, 400 Majestic Bldg., Fort Worth, engr. Noted Sept. 28.

Tex., Griffing Park—City, c/o L. L. Abshire, mayor, Box 193, Porth Arthur, plans waterworks improvements and extensions, incl. 6 in. c.i. watermains and fire hydrants. P.W.A. approved $18,000 allotment. Howe & Wise, 411 Scanlan Bldg., Houston, engrs.

Tex., Hearne—City, c/o W. H. Ely, mayor, election Aug. 6, $20,000, for waterworks improvements. Will take bids as soon as bonds are voted. J. W. Beretta Engineers, Inc., Natl. Bank of Commerce Bldg., San Antonio, engrs. Noted Mar. 1.

Tex., Hughes Springs—City, c/o G. E. Goolsby, mayor, plans waterworks and sewers. P.W.A. approved $82,000 allotment. Municipal Eng. Co., Burt Bldg., Dallas, engrs. Noted Oct. 26.

Tex., Lindale—City, c/o M. H. York, mayor, plans water and sewerage systems, incl. elevated tank, well, pumps, distribution system and sewer collecting system. P.W.A. approved $57,000 allotment. Montgomery & Ward, Wichita Falls, engrs. Noted Dec. 28.

Tex., Marquez—City, c/o R. D. Barkley, mayor, plans waterworks. P.W.A. approved $26,000 allotment. Southwestern Eng. Co., Littlefield Bldg., Austin, engrs. Noted Aug. 31.

Tex., Morgan—City, c/o C. M. Buie, mayor, plans purchasing existing system, new tanks, pipe lines, hydrants, etc. for waterworks. P.W.A. approved $16,000 allotment. J. R. Pelich, 400 Majestic Bldg., Fort Worth, engr. Noted Aug. 3.

Tex., Poth—City, c/o W. Eckel, mayor, plans waterworks. P.W.A. approved $33,000 allotment. A. A. Pirie, 655 Woodlawn Ave., San Antonio, engr. Noted Jan. 18.

Tex., Roanoke—City, c/o H. W. Jenkins, mayor, plans waterworks. P.W.A. approved $24,000 allotment. F. J. Von Zuben, 820 Fair Bldg., Fort Worth, engr. Noted Jan. 11.

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Streets and Roads 32
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Unclassified 34
Waterworks 29

Buildings:

Public 36
Commercial 38
Industrial 39

Federal Government projects are classified under heading denoting type of work and designated by symbol of †

◆

Tex., Rusk—City, c/o E. R. Gregg, mayor, plans water and sewer line extensions. P.W.A. approved $35,000 allotment. C. F. Click, Rusk, engr. Noted Oct. 12.

Tex., Savoy—City, c/o P. O. Ruthven, mayor, plans waterworks. P.W.A. approved $21,000 allotment. C. E. Hayden, Denison, engr. Noted Nov. 2.

Tex., Sweetwater—City, c/o S. H. Bothwell, city mgr., election Aug. 28, bond issue for waterworks improvements. $160,000. P.W.A. project. Hawley, Freese & Nichols, Capps Bldg., Fort Worth, engrs. Noted July 12.

Tex., Wells—City, c/o J. H. Dubose, mayor, plans waterworks improvements, incl. well, pump, motor, surface reservoir, elevated tank, distribution system, fire hydrants. P.W.A. approved $20,000 allotment. J. Rady, 400 Majestic Bldg., Fort Worth, engr. Noted Oct. 19.

Tex., Woodsboro—City, c/o E. Fricke, mayor, plans waterworks and sewers. P.W.A. approved $62,000 allotment. M. C. St. John, 1406 Esperson Bldg., Houston, engr. Noted July 20, 1933.

Utah, Cedar City—City plans developing springs, replacing stave pipe, and constructing reservoir. $28,000. P.W.A. loan granted. Noted Feb. 22.

Utah, Centerfield—City plans replacing wooden pipe with c.i. pipe. $22,000. P.W.A. loan granted. C. A. Erickson, Gunnison, engr. Noted Jan 18.

Utah, Gunnison—City plans modernizing present water system. $20,000. P.W.A. loan granted. C. Erickson, Gunnison, engr.

Utah, Kanab—City plans replacing present distribution system with c.i. pipe, installing hydrant and chlorinating plant. $40,000. P.W.A. loan granted. Noted Sept. 15, 1932.

Utah, Koosharem—City plans replacing wood and vitr. tile line with c.i. pipe. $15,000. P.W.A. loan granted.

Utah, Layton—City plans installing filtration plant $25,000. P.W.A. loan granted. Noted Jan. 25.

Utah, Lehi—City plans replacing wooden pipe with c.i. pipe. $38,000. P.W.A. loan granted. E. B. Jones, Lehi, engr.

Utah, Midway—City plans replacing distribution system and installing hydrants. $35,000. P.W.A. loan granted. Noted Jan. 11.

Utah, Milford—City plans steel water tank and extending distribution system. $20,000. P.W.A. loan granted. M. P. Lewis, Milford, engr.

Utah, Plymouth—City plans reservoir and distribution system. $15,000. P.W.A. loan granted. C. O. Roskelly, Brigham City, engr. Noted Jan. 11.

Utah, Springville—Election, Aug. 1 to vote on bonds to go as security for P.W.A. loan for water system additions and extensions. $88,000. Caldwell & Richards, Templeton Bldg., Salt Lake City, engrs.

Utah, Tremonton—City plans pipeline replacements and reservoir improvements. $21,000. P.W.A. loan granted. C. O. Roskelly, Brigham City, engr.

Utah, Wellington—City plans replacing wood pipe distribution system with c.i. pipe. $26,000. P.W.A. loan granted.

†*Federal Government.*

Waterworks (Continued)

Utah, Woodruff—City plans supply main, distributing system reservoir, $20,000. P.W.A. loan granted. J. J. Ried, Woodruff, engr. Noted Apr. 27, 1933.

Wis., Green Bay—City making plans 1,600 lin.ft. 12 in. c.i. pipe of which 200 ft. will be under river. J. S. Hartt, 122 Washington Ave., Madison, engr.

Wis., Marion—City completing plans and soon takes bids waterworks system. $75,000. $62,000 P.W.A. funds allotted. A. E. McMahon Co., Menasha, engrs. Noted Aug. 24.

Wis., Racine—Waterworks Dpt. completed preliminary plans and takes bids in about 60 days. 8 mi. feeder mains, meter house, 4 new filter beds, 8,000 gal. capacity. $300,000. P.W.A. project. Alcord, Burdick & Howson, 20 North Wacker Dr., Chicago, Ill., engrs.

BIDS ASKED

Calif., Glendale—See "Contracts Awarded."

Ind., Bedford—Aug. 6, by City, new water filtration plant, reservoir and pumps. $73,000. C. Brossman, 1009 Chamber of Commerce, Indianapolis, engr. Former bids rejected. Noted July 5.

Ia., Decorah—City taking bids 500,000 or 750,000 gal. concrete reservoir. P.W.A. project. C. Altfillisch, city engr.

Mass., Norfolk—July 31, by Commonwealth of Massachusetts, Dpt. Correction, Supt. of State Prison Colony, constructing 150,000 gal. elevated steel storage tank, constructing dug well. $65,000. P.W.A. project. Noted Apr. 26.

Minn., Warroad—Aug. 10, by Village, constructing 105 ft. well. P.W.A. project. A. F. Meyer, 628 Metropolitan Bank Bldg., Minneapolis, engr. Noted Feb. 18.

N. Y., Orangeburg—Aug. 8, by Commissioner Mental Hygiene, State Office Bldg., Albany, additional water supply facilities and additions to sewage disposal plant, at Rockland State Hospital.

N. C., Lexington—Aug. 21, Mayor and Bd. Aldermen, waterworks system, concrete dam, pumping station with flanking earth fills and concrete core walls for impounding water on Leonard Creek, clearing and grubbing of area to be flooded, pumping equipment, c.i. pipe for 12 in. main and laying thereof. $100,000. P.W.A. loan. W. C. Olson, Raleigh, engr. Noted May 24.

Tex., Cleburne—Aug. 7, by City, c/o T. L. Lain, supt. Water Dpt., waterworks improvements, well pump, booster pump and water meters. $35,000. P.W.A. project. W. G. Clarkson & Co., and P. K. Wirner, First National Bank Bldg., Fort Worth, assoc. archts. and engrs. Noted May 10.

Tex., Pasadena—Aug. 15, by City, c/o W. C. McMasters, mayor, waterworks and sewer extensions. $38,000. P.W.A. project. Culpepper & Flagg, Rusk Bldg., Houston, engrs. Noted July 19.

Tex., Port Lavaca—Aug. 2, by City, c/o F. M. Dudgeon, mayor, drilling new wells, pumping equipment, supply mains, fire hydrants and repairs. $54,000. P.W.A. project. J. C. McVea, 1318 Kipling St., Houston, engr. Noted June 28.

N. Y., Willard—Aug. 8, by Commissioner Dpt. Mental Hygiene, Albany, water softening apparatus, etc., addition to power plant addition, Willard State Hospital.

Tex., Weslaco—Aug. 14, by City, c/o H. Ratliff, mayor, waterworks and sewer improvements. $50,000. P.W.A. project. E. P. Arneson, Gunter Bldg., San Antonio, engr. Noted Apr. 19.

CONTRACTS AWARDED

Ark., Benton—See "Public Buildings."

Ark., Stamps—Dr. E. D. Brown, mayor, City Council, additions to present waterworks system, except meters, to McEachin & McEachin, Rector Bldg., 3rd and Spring Sts., Little Rock, $37,259. **P.W.A.** Awarded July 10.

Calif., Centerville — Centerville Water Co., constructing 50,000 gal. hemispherical bottom steel tank on 75 ft. steel tower, to Chicago Bridge & Iron Wks., 116 New Montgomery St., San Francisco, $4,000.

Calif., Glendale—City watermains in Valley View, Mountain and Kenneth Aves., involving 3,770 ft. 16 in. c.i. pipe, 4 valves, 11,000 lb. fittings, force account. Est. $13,000 for materials and application for labor at $4,260 has been filed with S.E.R.A. J. C. Albers, City Hall, engr.

Calif., Los Angeles — Bd. Water & Power Comrs., H. A. Van Norman, ch. engr. and genl. mgr. of Water Bureau, authorized that work start immediately on Mono Basin development, incl. conduits to intercept waters of Lee Vining, Parker, Walker and Rush Creeks and diverting them into Grant Lake where dam will be built; boring 13 mi. tunnel through Mono Craters to connection with Owens River, near Bald Mountain and bringing on Mono Basin Waters to Los Angeles by means of present Owens River Aqueduct. Preparatory work now under way, incl. building of 4 construction camps, telephone, power, and water supply lines and building of many miles of roads and trails. Three year program calls for expenditure of $7,500,000. Owner builds. Entire Mono Project, incl. Long Valley Dam and general improvement to aqueduct system involves expenditure of $13,000,000.

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Calif., San Francisco—Public Utilities Comn., City Hall, constructing Calaveras Aerator, Spec. W.D. 47, 68x106 ft. rein.-con. aeration basin, 12½x54 ft. wood frame valve house and screen chamber to be constructed near base of Calaveras Dam, 10 mi. southeast of Sunol, to E. T. Lesure, 87 Ross Circle, Oakland, $84,930. Bids July 6, awarded July 10. Noted June 28.

Ind., Goshen—City, general contract improving waterworks, to J. I. Barnes, Barnes Bldg., Logansport, $52,363***deep wells, to Lane & Northern Co., Mishawaka, $93,440***elevated tank, to Hamilton Iron Wks., Goshen, $24,450***pumps, to Fairbanks Morse Co., 900 South Wabash Ave., Chicago, Ill., $13,323***watermains, to Dandrea & Vaete, Chicago Heights, $4,695. Grand total $188,271. **P.W.A.** Bids July 2. Noted June 14.

Ia., Cedar Rapids—City, waterworks extensions, to J. B. Clow & Sons, 201 North Talman Ave., Chicago, Ill., $23,358 and to Iowa Valve Co., 201 Hubbell Bldg., Des Moines, $1,147. **P.W.A.** Noted Mar. 15.

Ia., Council Bluffs—City, waterworks extensions and improvements, to American Cast Iron Pipe Co., Fidelity Bldg., Kansas City, Mo., $21,197***to Glamorgan Pipe & Fdry. Co., 122 South Michigan Ave., Chicago, Ill., $33,686*** and to DeLaval Steam Turbine Co., 900 Clinton St., Trenton, N. J., $1,518. Grand total $56,401. **P.W.A.**

Ia., Oakland—City, waterworks system, to J. W. Roy & Sons, Oakland, $9,120***to Fairbanks-Morse Co., 9th and Harney Sts., Omaha, Neb., $1,504***to C. L. Moore, Oakland, $785***and to Thorpe Bros. Well Co., 2340 6th St., Des Moines, $1,925. Grand total $13,334. **P.W.A.**

Ia., Rembrandt—City, waterworks system, to C. W. Roland, Des Moines, $6,525***to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, $4,725***and to Interstate Mchy. Supply Co., 1006 Douglas St., Omaha, Neb., $817. Grand total $12,067. **P.W.A.**

Ia., Roland—City water plant fire station, to B. Cole & Son, Ames, $17,410. **P.W.A.**

Ia., West Union—City waterworks system, to Pittsburgh-Des Moines Steel Co., 1015 Tuttle St., Des Moines, $12,824. **P.W.A.**

Ky., Junction City—L. Kelley, city clk., waterworks system, incl. supply line along William Howard Taft Hy. between Danville and Junction City, distribution system, 50,000 gal. reservoir, meters and services, to American Cast Iron Pipe Co., 2930 North 16th St., Birmingham, Ala., $23,531***to Rennselaer Valve Co., Ontario St., Troy, N. Y., $2,381***to Knight Eng. Co., Washington Bldg., Louisville, Ky., $15,728***to W. E. Caldwell Co., 200 East Brandeis St., Louisville, $5,442***to Wilson Mchy. & Supply Co., Lexington, $2,335*** and to Hydraulic Development Co., 50 Church St., New York, $930. Grand total $50,347. Bids June 19. Noted June 14.

†Md., Aberdeen—Con. Q.M., watermains and storm sewers, to Marino Contg. Co., 305 North Exeter St., Baltimore, $27,910. Bids July 6. Noted June 28.

Minn., New York Mills—Village, installing and furnishing mains for waterworks improvements, to Jacobs Bros., Bird Island, $18,920*** tank and tower, to Challenger Co., Batavia, Ill., $5,540***pump and pump house, to J. A. Shaw Constr. Co., 104½ Bway., Fargo, N. D., $1,850***well, to P. G. Thein, Clara City, at $7.75 per ft. **P.W.A.** Noted Apr. 12.

N. Y., White Plains—Commissioner P. Wks., 12 in. main in New York Post Rd., to Inter County Constr. Co., Cedar and Sylvan Pl., Rye, $18,872***10 in. main in Gedney Way, to Globe Constr. Co., 618 Van Ranst Pl., Mamaroneck, $3,324***8 in. main in Ferris Ave., to David Richards & Sons, Inc., 567 North St., White Plains, $12,946***c.i. pipe, to Warren Fdry. & Pipe Corp., 11 Bway., New York, $9,958. Grand total $45,100. **P.W.A.** Bids June 1. Noted May 24.

O., Norwood—City, rehabilitating 4 wells for Water Dpt., to Jos. Koehne Sons, Norwood, $2,000.

O., Plymouth—Village, water softening plant, to Bever & Morris, Blackstone Bldg., Cleveland. Est. $15,000. **P.W.A.** George A. Reese, Clark Bldg., Canton, engrs.

Tex., Bridgeport—City, H. Hardy, mgr., elevated tank, to Chicago Bridge & Iron Wks., 37 West Van Buren St., Chicago, Ill. Noted June 7.

Wash., Tacoma—Bd. Contracts & Awards, 9,848 ft. 52 in. electric welded steel pipe for waterworks, to Birchfield Boiler Co., 2303 East 11th St., Tacoma, $102,028***9,095 ft. 52-in. 63-in. centrifugal, reinforced spun concrete pipe, to American Concrete Pipe Co., 459 East 15th St., $107,063***valves, to Hunt & Motett Co., 2112 Pacific Ave., $7,962***flexible couplings, to Pacific Water Wks. Supply Co., Atlantic St. Dock, Seattle, $1,162. Grand total $218,215. Bids July 10. **P.W.A.**

W. Va., Moorfield—City, installing waterworks system, incl. infiltration well, pumps, watermains, to Cumberland Contg. Co., Cumberland, Va., $42,297. **P.W.A.** Noted Mar. 1.

Que., Quebec City—City Council, laying 24 in. watermain under St. Charles River, to J. A. Auclair Ltd., de Molles, 266 St. Olivier St., Quebec City, $79,700. Noted Jan. 18.

SEWERAGE AND WASTE DISPOSAL

PROPOSED WORK

Calif., Maxwell—See "Waterworks."

Ill., Marengo—City plans sewage treatment works. $37,000. Applied for P.W.A. loan. W. G. Kirchoffer, 22 North Carroll St., Madison, Wis., engr.

Mass., Somerville—City, J. E. Mullaney, engr. City Hall, making plans concrete or vitr. clay sewers. $50,000 P.W.A. grant approved.

Mo., Brentwood—City plans sanitary trunk sewers to serve city and feed into eastern portion of proposed county-wire sewerage system. $85,140. $84,000 grant and loan allotted by P.W.A. W. C. Berry, 20 South Central Ave., Clayton, engr. Noted Mar. 15.

Mo., Joplin—City soon takes bids sewer improvements and extensions $90,000. P.W.A. grant and loan allotted; remodeling municipal market. $34,200 allotted by P.W.A. J. N. Hodgson, city engr. Noted Jan. 18.

Mo., Monett—Soon takes bids sewage disposal plant. $50,000. P.W.A. funds allotted. $40,000 bond voted. Burns & McDonnell Eng. Co., 107 West Linwood Blvd., Kansas City, engrs. Noted July 12.

N. J., Fanwood—Boro plans sewers. P.W.A. project. J. T. Topkins, Municipal Bldg., Westfield, engr.

N. Y., Buffalo—City, G. J. Summers, comr. P. Wks., plans closed drain in Black Rock Section through bed of Old Erie Canal from Bridge St. to Cornelius Creek Drain. $600,000. C. L. Howell, asst. city engr. in charge.

N. Y., Syracuse—Supervs., Onondaga Bd., plans Ley Creek Sewer Project, incl. intercepting sewer around northern and eastern boundaries of Syracuse. $1,750,000 of which $850,000 is for materials. J. A. Langan & Glenn Holmes, c/o owner, engrs. Noted Jan. 25.

O., Mansfield—City plans complete rebuilding municipal sewage disposal plant. C. M. Lantz, mayor. To exceed $25,000. James F. Carrigan, Service Dir.

S. C., Rock Hill—City, T. C. Marshall, mgr., plans sewers, involving 4,616 ft. 16 in., 1,000 ft. 18 in. and 4,137 ft. 12 in. c.i. pipe line, 350 ft. 16 in. c.i. crossings, pumping stations, 13 manholes, 5,500 ft. 21 in. sewer, 7,800 ft. 24 in. and 6,700 ft. 27 in. sewer, 1,600 ft. 24 in c.i. tunnel, 100 ft. 24 in. c.i. railroad tunnel $263,000. P.W.A. approved loan. Noted Jan. 11.

Tex., Elkhart—See "Waterworks."

Tex., Hughes Springs—See "Waterworks."

Tex., Kirbyville—City, c/o J. Singleton, secy., plans sanitary sewer and disposal plant. P.W.A. approved $48,000 allotment. H. L. Thackwell, Tyler, engr. Noted Dec. 14.

Tex., Rusk—See "Waterworks."

Tex., Terrell—City, c/o L. A. Markham, mayor, plans sanitary sewerage system and disposal plant. P.W.A. approved $299,000 allotment. Powell & Powell, Republic Bank Bldg., Dallas, engrs.

Tex., Woodsboro—See "Waterworks."

Wis., Barton—City, J. Willkom, clk., making plans sewage disposal plant and equipment. $30,000. J. Donohue Co., Sheboygan, engrs. Noted July 19.

Wis., Burlington—City making plans sewage disposal plant. R. Cramer & Sons, Milwaukee, engrs.

†Federal Government.

Sewerage, etc. (Continued)

BIDS ASKED

Calif., Los Angeles—See "Contracts Awarded."

†**Calif., San Diego**—Aug. 22, by Yards & Docks, Navy Dpt., Wash., D. C., sewers, water and gas lines and electrical ducts, cables, equipment at Naval Operating Base Air Station. Spec. 7425.

Ia., Decorah—See "Contracts Awarded."

Mass., Boston—Aug. 6, by City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex, concrete or vitr. clay sewer in Savin Hill Ave. P.W.A. project.

Minn., Minneapolis — See "Contracts Awarded."

Minn., St. Paul—July 31, by H. W. Austin, city purch. agt., constructing part of Sewer Interceptor C. $25,000. P.W.A. project. G. M. Shepard, city engr.

Mo., St. Louis—See "Contracts Awarded."

N. Y., Brooklyn—Aug. 1, by R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, storm water and sanitary sewers in Voorhies and Guider Aves., 5th and East 14th Sts.

N. Y., Geneva—Aug. 2, by Bd. P. Wks., outfall sewer, incl. 224 ft. 24 in. pipe underground, 685 ft. 30 in. pipe of which 440 ft. is under water. N. S. Hill, Jr., 112 East 19th St., New York, engr.

N. Y., Long Island City—July 30, by J. J. Halleron, acting pres. Queens Boro, sewers in 119th Rd., Remsen Pl., Fairview, Penelope, Woodside, 104th, Hollis, and North Conduit Aves., 69th, 224th, 194th, 147th, 156th, 178th Sts.; automatic electrical pumping station, at 180th St. and Horace Harding Blvd., force main from pumping station to built sewer in 108th St. and sanitary sewer and appurtenances in Horace Harding Blvd.

N. Y., Ossining—July 31, by Commissioner Dpt. Correction, State Office Bldg., Albany, sewers and waterlines at Sing Sing Prison.

N. Y., Ticonderoga—Aug. 9, by Adjutant General, Capitol, Albany, constructing sewers and waterlines at State Armory.

Tex., Dallas—Aug. 8, by City, c/o E. Goforth, secy., installing pumping equipment in Cadiz St. Sewage Pumping Sta., 81 ft. 5 in. head centrifugal non-clogging sewage pump, 40 ft. head centrifugal sump pump with motor, 1 gas engine for driving sewage pump, depth gauge in place, flow meter, self cleaning sewage screen incl. equipment. P.W.A. project. O. H. Koch, dir. P. Wks.

Tex., Dayton—Aug. 9, by City, c/o W. S. Neel, secy., complete sewerage system and disposal plant, 31,170 ft. 4- to 10-in. vitr. clay pipe, 1 pump house, pump pit, sewer pump and fittings, 1 extra sewer pump, wyes, tees, etc. Est. $32,000. P.W.A. project. H. L. Fugate, Houston, engr. Noted July 12.

Tex., New Castle—Aug. 7, by City, c/o City Secretary, complete sanitary sewerage system and disposal plant, $40,000. P.W.A. project. Montgomery & Ward, Harvey-Snider Bldg., Wichita Falls, engrs. Noted Mar. 15.

Tex., Pasadena—See "Waterworks."

Tex., Weslaco—See "Waterworks."

Wash., Seattle—Aug. 2, by Bd. P. Wks., City Hall, clay or concrete pipe for sewers in connection with Railroad Avenue Paving Project. Bids to have been opened July 19 recalled. $23,000. M. O. Sylliaasen, city engr.

CONTRACTS AWARDED

Ark., Benton—See "Public Buildings."

Calif., Los Angeles—Los Angeles Co. Sanitation Dist. 5, West Torrance Trunk Sanitary Sewer, involving 9,312 ft. 15 in. sanitary sewer pipe, 31 structures, 1,350 ft. concrete cradle for pipe; also Manchester Ave. Pump Trunk Sanitary Sewer, 13,316 ft. 8- to 18-in. sanitary sewers, 46 structures, 184 lin.ft. concrete cradle for pipe, 4 concrete piers for c.i. pipe, force account under S.E.R.A. financing, under supervision of A. K. Warren, Law Bldg., engr. Est. $37,500 and $35,000 respectively.

Calif., San Francisco—S. J. Hester, secy. Dpt. P. Wks., City Hall, rein.-con. sewer in 3rd St. from 23rd St. to Islais Creek Channel, to Union Paving Co., Call Bldg., $88,330. Est. $75,000. Bids June 5, awarded July 12. **P.W.A.**

Ia., Decorah—City, sewers for project under bridge on Highway 55, day labor. C. Atfillisch, Decorah, engr.

Ia., Cedar Rapids—City, auxiliary piping for sewage disposal plant addition, to Bemis & Schlick, 721 South Sur. Blvd., Des Moines, $219,821; and to Frederickson & Moorehead, Cedar Rapids, $7,847. **P.W.A.** Bids Mar. 16.

†*Federal Government.*

Ia., Iowa Falls—City, sewage disposal plant, incl. Imhoff tank auxiliary piping, to Welden Bros., Iowa Falls, $46,880. **P.W.A.** Noted Sept. 7.

Ia., Newton—City, sewage disposal plant and piping, to A. F. Mathis, Valley Junction $38,210; and to Gjellefald Constr. Co., Forest City, $8,162. **P.W.A.** Noted Oct. 12.

Md., Baltimore—Bd. Awards, sanitary sewers, Contr. 291, to J. Matricciani, 229 South Exeter St., $28,998. Bids July 7.

Mass., Boston—City, Dpt. P. Wks., C. J. Carven, comr., City Hall Annex, concrete sewer lines in Everett St., Brighton, to New York Central R.R., lessee of Boston and Albany R.R., South Station, Boston, $22,500. Awarded July 9.

Minn., Bemidji—City sewage disposal plant, to Leck Constr. Co., 513 3rd Ave. N.E., Minneapolis and Dickinson Constr. Co., Bemidji, $73,298. P.W.A. Bids July 9.

Minn., Lake City—City, July 16, sewage disposal plant, from L. H. Sault, 551 Gilfillan Blk., St. Paul, and from G. Swartz, 1154 Southwest 3rd St., Rochester, $43,379***lift station, from F. M. Olson, Lake City, $3,930 ***outlet sewer and watermain from J. C. Schneider, Independence, Wis., $8,400 and respectively.

Minn., Minneapolis—City constructing Sect. B of North Minneapolis Interceptor Sewer in 27th Ave. N., 2nd and 1st Sts., and Sect. A, same sewer in 2nd St., day labor under direction F. T. Paul, city engr., $97,875 and $120,698 respectively. **P.W.A.** Bids June 28 rejected.

Mo., St. Louis—City reconstructing and repairing Old Mill Creek Sewer from Vandeventer Ave. to Mississippi River, incl. replacing wooden floors with concrete, sides and roof will be repaired and coated with application of liquid concrete applied under pressure, by city forces, under direction of Assistant Sewer Commissioner Paffrath. $111,000. **P.W.A.** $31,000 allotted by P.W.A. L. A. Pettus, city engr. Noted June 21.

Mo., Springfield—City constructing Bond Issue Sewer Item 19, extending drainage from Beach to Pennsylvania to Phelps Grove, incl. 2,400 cu.yd. earth and 30 cu.yd. rock excav.; 1,955 cu.yd. concrete in place; 168,000 lb. reinforcing steel; 1,500 lb. miscellaneous castings; 330 ft. 6 in. house connections, 3 box inlets, to Lay Constr. Co., North Kansas City, $31,968. Est. $42,023. **P.W.A.** Bids July 17.

Neb., Grand Island—City, brick, concrete storm sewers, manholes and catchbasins, to W. Kelley & Co., Grand Island, $150,581. Est. $180,000. **P.W.A.** Bids July 13.

N. Y., Brooklyn—R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, to B. Turecamo Contg. Co., 1573 63rd St., asphalt paving Empire Blvd., $28,991; Coney Island, $24,880; East 19th St., $13,679; Lincoln Pl., $9,433; Stone Ave., $9,158***to A. Suriano, foot 24th Ave., grading Avenue C, $2,878***to H. F. Grofsick, 228-44 Mentone St., granite paving Pennsylvania St. $10,524. Grand total $99,544. Bids July 5. Noted June 28.

N. Y., New York—J. J. Lyons, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., to Naclerio Constr. Co., 2562 Wallace Ave., sewers in Allerton Ave. $13,011; Seward Ave. $11,154; Leyden Pl. $8,789***to G. Kearns, Inc., 341 Jackson Ave., East 141st St. $18,361 ***to F.P.S. Contg. Co., 2883 Eddington Ave., Oak Point Ave. $32,474. Grand total $83,789. Bids July 11. Noted July 5.

N. Y., Penn Yan—City, spray nozzles and Dosing tank syphon for sewerage disposal works, to Pacific Flush Tank Co., 136 Liberty St., New York, $726. Noted June 21, under "Contracts Awarded. **P.W.A.**

O., Springfield—City, constructing Buck Creek Intercepting Sewer, Sect. E, Contr. 12, involving laying 6,830 ft. 48- to 72-in. rein.-con. pipe (furnished by city), manholes, etc., to J. C. Cashman, Springfield, and W. S. Rae, Koppers Bldg., Pittsburgh, Pa. $51,795. Est. $63,494. **P.W.A.**

Tex., Humble—City, c/o M. D. Dubose, mayor, sanitary sewers and disposal plant, to Cambridge Constr. Co., 2102 Fredricksburg Rd., San Antonio, $44,327. **P.W.A.** Noted June 7.

Wis., Menomonee—City, constructing sewage disposal plant, to Fluor Bros. & Smith, 48 Otter St., Oshkosh, $22,700. Bids July 12. Noted July 19.

BRIDGES AND GRADE CROSSINGS

PROPOSED WORK

Calif., San Francisco—Golden Gate Bridge & Hy. Dist., 111 Sutter St., making plans reconstructing U. S. Government improvements at San Francisco Presidio which are to be relocated to clear right-of-way for bridge structures over Golden Gate Strait, and replacement of buildings, ammunition magazines, roads, railroad tracks and utilities. $350,000.

Conn., Milford—Town, Town Hall, made plans constructing arch type rein.-con. bridge over Wepawaug River. $25,000.

Indiana—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad Street Sta., Phila., Pa., making plans constructing deck girder bridges in Bridgeport, Lynn and Charlottesville.

Ind., Connersville—State Hy. Comn., Indianapolis, plans new bridge over Whitewater River on East 5th St., Fayette Co. J. A. Adams, chn.

La., New Orleans—Orleans Levee Bd. plans new bridge across Bayou St. John, near lake in Orleans Parish. Application filed with U. S. Engineers for permission to build.

Mass., Revere—Commonwealth of Massachusetts, Dpt. P. Wks., Boston, F. E. Lyman, comr., A. W. Dean, ch. engr., 100 Nashua St., Boston, making plans rein.-con., steel bridge to reconnect North Shore Rd. with Point of Pines Bridge (now under construction) over Boston, Revere Beach Lynn R.R. tracks. $356,000. P.W.A. project.

Mo., Carthage—State Hy. Dpt., Jefferson City, bids in August, constructing rein.-con. viaduct to carry State Hys. 66 and 77 over Missouri Pacific R.R. tracks. $80,000.

N. Y., Buffalo—Bd. Supervs. Erie Co. plans 8 steel, concrete highway bridges at various locations. $50,000. C. H. Fosdick, supt.

Tenn., McMinville—State Hy. Dpt., Nashville, instructed J. Gentry, engr., McMinville, to proceed with preliminary plans and surveys for erection of 4 span bridge over Barren Fork River. $100,000.

Tex., Wharton—Wharton Co., c/o J. Norris, judge, plans constructing 12 bridges in Wharton Co. P.W.A. approved $118,800 allotment. J. G. Turney, Wharton, engr. Noted Nov. 23.

Utah, Ogden—City plans 125 ft. concrete, steel bridge over Ogden River. $180,000. C. L. Corey, city engr.

Man., Selkirk—Dpt. P. Wks., soon takes bids steel bridge over Red River. $250,000.

Sask., Outlook—Dpt. P. Wks. preparing plans for bridge over South Saskatchewan River. $275,000.

BIDS ASKED

Calif., Ukiah—Aug. 14, by H. M. Burke, clk. Mendocino Co., constructing 150 ft. steel span bridge to replace old wooden bridge 5 mi. east of Laytonville; constructing 1,300 ft. proposed Union Landing Rd. from Eng. Sta. 17 plus 00 to Sta. 31. Plus 00, involving **(a)** 12,732 cu. yd. unclassified excav., incl. all clearing **(b)** overhaul per cu.yd. for each 100 ft. in excess of first 1,000 ft. from point of operation.

Colo., Chivington—See "Contracts Awarded."

Ind., Auburn—Aug. 3, by Bd. Comrs. DeKalb Co., constructing new bridge over Cedar Creek, at 9th St. F. E. Lyon, Auburn, aud.

Louisiana—July 31, by State Hy. Comn., Baton Rouge, sidewalks and overpass of Y. and M. V. R.R., 0.43 mi. Project 410-A, N.R.M. 226-A, Webster Parish, involving 11,073 cu.yd. roadway excav. W. H. Norckauer, state hy. engr. A. P. Tugwell, chn. of Hy. Comn.

Maine—Aug. 1, by State Hy. Comn., State House, Augusta, bridge over Penobscot River, between Howland and Enfield, involving 2,080 cu.yd. rein.-con. sub-structure and floor, 750 tons structural steel superstructure. L. D. Barrows, ch. engr. M. L. Wilder, bridge engr., Augusta. To exceed $100,000.

Maryland—July 31, by State Roads Comn., Baltimore, three 37 ft. span steel girder bridge, on East-West Hy., Contr. M-271-3-38, Montgomery Co.; double span each 35 ft., rigid frame bridge over Big Pipe Creek, at Union Mills, Contr. C1-140-1-511, Carroll Co. P.W.A. project.

Massachusetts—July 31, by J. P. Thompson, chn. Bd. Selectmen, of town of Halifax at office of Dpt. P. Wks., Boston, constructing 2 creosoted pile timber bridges with concrete decks one 54 ft. span over Bartletts Brook and one 74 ft. span over Wenatuxet River, for Commonwealth of Massachusetts and town of Halifax. $100,000. State Aid Project.

New York—Aug. 2, by Triborough Bridge Authority, 111 8th Ave., New York, Queens Approach Piers of Triborough Bridge, connecting boros of Manhattan, Bronx and Queens, Contr. 21; adv. E.N.-R. July 26. Noted May 24, under "Contracts Awarded."

N. Y., Naumburg—Aug. 7, by R. D. Hayes, com., Div. Canals & Waterways, constructing superstructure and back-walls for bridge, Lewis Co. Contr. M-78.

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Bridges, etc. (Continued)

CONTRACTS AWARDED

†Ark., Henrico—U. S. Eng., Box 97, Memphis, Tenn., concrete culvert, near here, to H. A. Forest, New Orleans, La., $17,502. Bids July 2.

Calif., Sacramento—State Hy. Comn., constructing bridge, consisting of one 209 ft. 6 in. through steel truss lift span, one 192 ft. 6 in. through steel truss fixed span, one 167 ft. 6 in. through steel truss fixed span and four steel girder spans from 34 ft. to 35 ft. in length, approaches to be graded and paved over Sacramento River at M St., to Pollock Co., P. O. Box 903, $907,365. Bids June 27, awarded July 14. Noted June 14.

Colo., Chivington—Missouri Pacific R.R. Missouri Pacific Bldg., St. Louis, Mo., steel bridge near here, day labor. Est. $25,000.

Indiana—State Hy. Dpt., Indianapolis, bridges in Knox Co., to Vincennes Bridge Co., Vincennes***17 bridges, Warrick Co., to Harvey Ellison, Folsomville***bridge in Crawford Co., to Dunn & Williams, Milltown***3 bridges in Posey Co., to C. J. Stein, Mount Vernon.

Michigan—State Hy. Dpt., Lansing, grade separation, N.R.H. X1 of 69-8-11-C-1, Otsego Co., consisting of three 46 ft. 6 in. spans, steel deck girder type with 42 ft. roadway, etc., to D. W. Thurston, 2411-14th St., Detroit, $46,851; N.R.M. B1 of 11-20-4, Contr. 4, Berrien Co., having two 25 ft. steel deck girder type spans, to Haines & Haines, Dowagiac, $14,251. Bids June 29.

Missouri—State Hy. Dpt., Jefferson City, bridges over Gasconade River and over Gasconade River and Gasconade River Overflow, Pulaski Co., to List & Clark Constr. Co., Kansas City***over Dry Branch Yadkin Creek, Crawford Co. and over Little Beaver Creek, Douglas Co., to Carte-Harlin Constr. Co., West Plains***culverts in Newton Co., to Lay Constr. Co., Kansas City***culverts in Linn Co., to Samples & Elsea, Kirksville***bridge, Warren Co., to Davis Constr. Co., Inc., Boonville. Noted June 28.

Missouri—State Hy. Dpt., Jefferson City, bridge over Town Creek, Warren Co., to Davis Constr. Co., Boonville***over Humphreys Branch, Carroll Co., to Samples & Elsea, Kirksville***over Black River and Missouri Pacific R.R., Butler Co., to Regenhardt Constr. Co., Cape Girardeau***underpass, in Linn Co., to G. Knutson, Kansas City. Bids June 15. June 11 Daily.

New Hampshire and **Vermont**—State Hy. Dpts. of New Hampshire, Concord and Vermont, Montpelier, 5 span 526 ft. deck plate girder bridge and approaches over Connecticut River between Littleton, N. H. and Waterford, Vt., to J. H. Cashman, Burlington, $112,982. Noted June 28.

N. J., Prallsville—Hunterdon Co. (Flemington), 2 span 54 ft., concrete, steel bridge over Wickecheoke Creek, to Delta Co., Hopewell, $14,665.

N. Y., Binghamton—City, bridge, to Wertz Co., 2294 Scranton Rd., Cleveland, O. $49,771. Bids June 28. Noted June 21.

N. Y., New York—J. L. Lyons, pres. Bronx Boro, Bronx County Bldg., 161st St. and Concourse, constructing viaduct in West 205th, to J. Leopold & Co., 60 West 42nd St., $180,182. Bids July 11. Noted July 5.

South Dakota—State Hy. Comn., Pierre, bridges in Lake Co., to James Robertson & Co., Madison, $5,883***Stanley Co., to O. Williamson, Fort Pierre, $7,029***Fall River Co., to Willis Bonesteel, Wagner, $25,678***Todd and Hand Counties to W. A. Barnhart Constr. Co., Salem, $6,210 and $2,982 respectively***Lake Co., to Dowd Bros., Inc., Clark, $3,149. Grand total $50,931. Bids July 11.

Texas—G. Gilchrist, state hy. engr., Austin, constructing Weatherford Texas and Pacific Viaduct, Hy. A, N.R.M. 132 C and D, Parker Co., to Purvis & Bertram, 1124 West 9th St., Fort Worth, $134,663. Est. $120,000. **P.W.A.** Bids June 18.

STREETS AND ROADS

BIDS ASKED

Calif., Glendale—Aug. 7, by City Council, grading, asphaltic concrete paving, concrete curbing, guttering, sidewalks, driveways, rein.-con. steps Verdugo Rd., from Las Crescenta Ave. to North City line. To exceed $17,750. J. C. Albers, City Hall, engr.

Indiana—July 31, by State Hy. Comn., Indianapolis, widening 0.618 mi. NRM 200-C, Canal St. and Forbes Ave., Vanderburgh Co.; 2.156 mi. N.R.M. 98-E, Allen Co.; 2.971 mi. N.R.H. 204-A, Newton Co.; 8.384 mi. 462-A, Johnson Co.; 20.58 mi. R-943, Tippecanoe Co.; 4.55 mi. R-944, Vermillion Co.; 10.24 mi. S-945, Madison Co.; 10.01 mi. S-945, Grand Co.; 23.05 mi. S-947, LaPorte and St. Joseph Counties; 7.17 mi. S-948, LaPorte Co.; 2.63 mi. S-949, Wayne and Randolph Counties; 12.92 mi. S-950, LaPorte Co.; 12.7 mi. S-951, Starke Co.; 5.10 mi. S-952, Morgan and Hendricks Counties; 5.892 mi. Project 300-A, Brown Co. $750,000.

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Iowa—July 31, by State Hy. Comn., Ames, surfacing 3.3 mi. M-459, Road 34 and P.R. 186 to Prescott; 6.8 mi. Rds. 34 and P.R. 9, to Lenox, both Adams Co.; 3.2 mi. M-460, P.R. 174 from P.R. 3 to Farragut, Fremont Co.; 8 mi. U.S. Rds. 30, M-461; 9.6 mi. P.R. 39, both Harrison Co.; 12.2 mi. P.R. 39, M-462, Shelby Co.; 7.9 mi. P.R. 148, M-463, Taylor Co. F. R. White, ch. engr.

Ia., Fort Madison—Aug. 1, by Lee Co., grading 11.521 mi. secondary roads, incl. 127,533 cu.yd. excav. M. F. McFarland, co. engr.

Maryland—July 31, by State Roads Comn., grading, drainage for dual hy. along Phila. Road relocation from Ha Ha Swamp to Otter Creek, on 1.61 mi. Contr. H-185-48, Harford Co.; concrete paving 2.45 mi. Southern Maryland Blvd., Contr. C-79-188, Calvert Co.; 0.3 mi. Takoma Ave., Contr. M-271-2-38, Montgomery Co.; concrete paving and header with bituminous surface 1.49 mi. Contr. Ce-146-1-28, Cecil Co., foregoing P.W.A. project; sheet asphalt paving 1.15 mi. Contr. BC-135-1-72, Federal Aid Project N.R.M. 240-C, Baltimore Co.

†Md., Aberdeen—Aug. 3, by Con. Q. M., Aberdeen Proving Ground, roads, drive-ways, walks, U. S. Proving Ground.

Mass., Boston—Aug. 8, by City, Dpt. P. Wks., C. J. Carven, com., City Hall Annex, granite block and sheet asphalt paving 1 mi. Southampton St. from Andrew Sq. to Mass Ave. To exceed $40,000. P.W.A. project.

Mo., St. Louis—See "Contracts Awarded."

New York—A. W. Brandt, comr. Hys., Albany, withdrew bids to have been opened July 31, grading, structures on Grand Parkway Extension. Will readvertise. Noted July 19.

N. Y., Brooklyn—Aug. 1, by R. V. Ingersoll, pres. Brooklyn Boro, Boro Hall, granite paving Beard St.; grading, asphalt paving Fort Hamilton Parkway, Thatford and 5th Aves., Avenue U, Berry, Hicks, Summit, Van Buren and 13th Sts.

N. Y., New York—July 30, by J. J. Lyons, pres. Bronx Boro, Bronx County Bldg., repairing sidewalks, etc. on Kingsbridge Rd., East 168th and East 172nd Sts., Anderson and Van Nest Ave.

N. Y., Syracuse—Aug. 7, by Dpt. Educ., Education Bldg., Albany, constructing roads, walks, grading, at New York State College of Forestry, Syracuse University.

South Carolina—July 31, by State Hy. Dpt., Columbia, concrete paving 0.184 mi. Route 321, York, N.R.M. 78, York Co.; widening and repairing 73 ft. 1 in. existing rein.-con. bridge over Fishing Creek and 181 ft. existing treated timber bridge over Allison Creek on Route 163, between York and North Carolina state line, incl. 25 cu.yd. dry and 480 cu.yd. common excav., N.R.S. 329-A, York Co.; constructing 150 ft. rein.-con. bridge over Whites Mill pond on U. S. Route 401 N.R.H. 359-B, Sect. 1, Sumter Co., $36,500. P.W.A. project.

Washington—Aug. 7, by L. V. Murrow, dir. State Hys., Olympia, grading, crushed stone surfacing 0.9 mi. and steel girder bridge on concrete piers over Yakima River and rein.-con. bridge across slough on State Rd. 8, Yakima River Vicinity, between Buena and Toppenish, F.W.P. 8031, Yakima Co.; pile and timber bulkheads, riprapping and crushed stone surfacing 1.8 mi. State Rd. 12, Fort Columbia to Point Ellice Bank Protection, P.W.P. 7754, Pacific Co., incl. 9,520 cu.yd. excav.; concrete paving 0.2 mi. Idaho St., Washington State College, Campus, Pullman, Whitman Co.

CONTRACTS AWARDED

†Ala., Montgomery—Con. Q.M., Maxwell Field, constructing roads, driveways, sidewalks, culverts, sewers, to Carter Contg. Co., Geneva, $38,795. Bids July 6. Noted July 5.

Arkansas—State Hy. Comn., Little Rock, grading, drainage structures, bituminous concrete paving 0.25 mi. Little Rock city connection (east section), involving 3,280 cu.yd. unclassified and 250 cu.yd. dry excav., to B. M. Hogan, 115 North Spring St., Little Rock, $19,929***grading, drainage structures, concrete paving 0.4 mi. McGehee Connection Hy. 1, Desha Co., to Deloney & Tatum, Dubach, La., $14,767***grading, drainage structures, traffic service gravel surfacing 1 mi. Kingston-North Rd., Hy. 21, Madison Co., to Batson Bros., Dardanelle, $18,678***grading, drainage structures, concrete paving 2 mi. Walnut Ridge-Paragould Rd., Hy. 25, Lawrence and Greene Counties, to Hartman-Clark Bros. Co., Peoria, Ill., $43,251***bridge on Siloam Springs-Springfield Rd., Benton Co., to L. Harris, Cushing, Okla., $32,427. Grand total. Bids July 18.

California—State Hy. Comn., Sacramento, widening, concrete and asphaltic concrete paving 1.4 mi. hy. along Potrero Ave. between Division and Army Sts., San Francisco, to San Francisco Co., to Union Paving Co., Call Bldg., San Francisco, $164,115***reconstructing Interurban car line from 18th St. to Army St., to T. Cohn, Russ Bldg., San Francisco, $12... Bids July 5, awarded July 10. Noted June...

Connecticut—D. V. Frione & Co., contractors, 35 Foxon St., New Haven, awarded subcontract for grading in section at Reservoir Ave., Goffe St., Church Rd., and Whitney Ave., Trumbull, to Pascone & Sons, 73 Steuben St., Bridgeport, $27,000; furnishing 420,000 cu.yd. fill for approach to bridge and approaches White Plains Rd., Trumbull, to S. Mossup, 178 Tunxis Hill Rd., Bridgeport, $80,000; for State Hy. Dpt., Hartford.

Ill., Chicago—Dpt. P. Wks. & Buildings, Div. Hys., concrete paving 0.8871 mi. Sect. 048-0[illegible] MFT, near Niles Center, Cook Co., to Mid West Constr. Co., 231 South LaSalle St., $39,656.

Ill., Collinsville—City, grading, concrete paving, to Hartman-Clarke Bros., Peoria, $55,[illegible] Est. $55,436. **P.W.A.** Bids July 6.

Ill., Taylorville—Christian Co., concrete paving 1.9602 mi. State Air Route 3, Sect. [illegible] MFT, to Hanes & Kilgo, Alton, $40,726. Noted July 5.

†Ill., Wheaton—Dpt. P. Wks. & Buildings, Div. Hys., traffic bound paving 0.6852 mi. Sect. 69-MFT, DuPage Co., to Scheflow & Monhan, Glen Ellyn, $15,315.

Indiana—State Hy. Dpt., Indianapolis, grading, concrete paving 15,880 sq.yd. Marion Co., to R. M. Bowen, 4430 Carrollton St., Indianapolis, $42,668. Est. $54,356. Bids May 15.

Indiana—State Hy. Dpt., Indianapolis, concrete paving 2,880 sq.yd. Lake Co., to Williston Constr. Co., South Bend, $11,045. Est. $11,814. Bids July 10. Noted July 5.

Indiana—State Hy. Comn., Indianapolis, grading, concrete paving 17,410 sq.yd. road in Lake Co., to Bontrager Constr. Co., Elkhart, $51,000. Est. $54,714. Bids May 15.

†Ind., Marion—Vet. Bu., Arlington Bldg., Wash., D. C., highway at U. S. Veterans Hospital, to Kokomo Constr. Co., Kokomo, $19,000.

Iowa—State Hy. Comn., Ames, concrete paving 0.265 mi. O'Brien Co., to Booth & Olson, Inc., Sioux City, $6,919***0.37 mi. Webster Co., to Des Moines Asphalt Paving Co., 2nd and New York Sts., Des Moines, $7,628***grading 12.427 mi. Harrison and Shelby Counties, to J. A. Carlson Constr. Co., 5181 Jackson St., Omaha, Neb., $83,424***bituminous surfacing 1.4 mi. Kossuth Co., to Kelly Constr. Co., Des Moines, $2,399***bridges and culverts Harrison and Shelby Counties, to Griffis Bros. Constr. Co., Valley Junction, $33,006. Grand total $113,376. **P.W.A.** Bids July 2, awarded July 17.

Ia., Ames—City, 7 in. rein.-con. paving 29,709 sq.yd., to Bemis & Schlick, 721 South Sun Blvd., Des Moines, $56,148. Bids July 20.

Ia., Dubuque—City paving Main St., to J. F. Lee, 18th and Pinnard Sts. $12,420 and $11,766***to K. M. Supply Co., $43,367***boulevard lights on various streets, to United Electric Co., 15th and Central Sts., $18,935. Grand total $86,488. **P.W.A.**

Ia., Indianola—Warren Co., grading 8.14 mi. County Trunk Road K, to Sargent & Roth, Garden Grove, $23,107. Bids July 13.

Kentucky — State Hy. Comn., Frankfort, to Wilmore Paving Co., Middletown, O., concrete paving 9.968 mi. Carrollton-Milton Rd., Carroll and Trimble Counties, $100,000***to J. M. Cain & Co., Inc., Williamsburg, grading draining 8.674 mi. Manchester-Hyden Rd., Clay Co., $128,286***to R. E. Mills Co., Inc., Frankfort, 11.348 mi. Verona-Glencoe Rd., Gallatin Co., $40,000***to Myers & Gorman, Flemingsburg, rock asphalt on waterbound macadam base surface mix paving 8.2 mi. Cadiz-Cerulean Rd., Trigg Co., $117,708; waterbound macadam paving 14.808 mi. Eminence-Ballardsville-Crestwood Rd., Henry and Oldham Counties, $60,564***to F. C. Gorrell & Sons, Russellville, concrete paving 7.923 mi. Louisville-Shelbyville Rd., Jefferson Co., $171,384***to G. M. Eady Co., 340 Byrne St., Louisville, 1.845 mi. Berry and Taylor Rds., Jefferson Co., $111,341***to Kentucky-Virginia Stone Co., Middlesboro, 0.987 mi. London-Corbin Rd., Laurel Co., $32,750; 1.773 mi. Williamsburg-Corbin Rd., Whitley Co., $44,159***to Carey-Reed Co., Lexington, 1.049 mi. Clay City-Stanton Rd., Powell Co., $33,123***to Blair & Franse Constr. Co., Lexington, bank or creek gravel surfacing 7.63 mi. Gorner-Blackey Rd., Letcher Co., $26,279***to Holmes Constr. Co., Wooster, O., general reconstruction of bridge over Levisa Fork of Big Sandy River, at Pikeville on Pikeville-Williamson Rd., Pike Co., closed to traffic, $15,906***to New England Stone Co., Madisonville, traffic bound limestone surfacing 9.151 mi. Princeton-Gracey Rd., Trigg and

†Federal Government.

Streets and Roads (Continued)

Caldwell Counties, $32,234; foregoing, bids June 28, awarded July 10***to Kentucky Road Oiling Co., Frankfort, asphalt cutback surface treating 11.572 mi. Frankfort-New Castle Rd., MP 64 1/2-A, Franklin Co., $13,308, bids June 29***to S. H. Hart Constr. Co., Lexington grading, draining 1.225 mi. Blackey-Ulvah Rd., FR 36-CG, Letcher Co., $18,195, bids Jan. 5. Grand total $945,237. Grading, surfacing 1.273 mi. Ashland-Cannonsburg Rd., N.R.H. 1-AGS, Boyd Co., by force account under N.R.A. regulations. State Hy. Dpt., Frankfort, rejected bids June 28, surfacing 7.654 mi. Eminence-La Grange Rd., S.P. 158-AS, Henry Co.; 7.154 mi. Crestwood-Ballardsville Rd., S.P. 158-BS Oldham Co. Noted June 7 and 21.

Maryland—State Roads Comn., Baltimore, concrete paving, curbing, guttering, sidewalks 0.29 mi. Contr. Wo-144-1-111 Worcester Co., to Phillips Bros., Salisbury, $20,898; sheet asphalt and concrete paving 0.5 mi. Contr. B-307-42, Baltimore Co., to P. Flanigan & Sons, Harford Ave. and Baltimore & Ohio R.R., Baltimore, $37,443. Bids July 10, noted July 5.

Maryland—State Roads Comn., Baltimore, concrete shoulders and roadway 3.81 mi. Contr. A-152-1-68, Alleghany Co., to G. F. Hazelwood, Cumberland, $78,998; concrete and macadam paving and combination curbing, guttering 2.4 mi. Contr. M-271-1-38 P-280-1-38, Prince George and Montgomery Counties, to Union Paving Co., Broad and Stiles Sts., Phila., Pa., and Tower Bldg., Wash., D. C., $92,653. Bids Feb. 6. Noted Feb. 1.

Maryland—State Roads Comn., Baltimore, macadam paving 1.56 mi. Contr. W-114-1-62, Washington Co., to Cumberland Contg. Co., Cumberland, $32,431. **P.W.A.** Bids Feb. 20. Noted Feb. 15.

Maryland—State Roads Comn., Baltimore, gravel paving 0.98 mi. Contr. SM-146-1-82, Beauvue-Valley Lee Rd., St. Mary's Co., to Jarboe & Haughton, Mechanicsburg, $11,628; concrete paving 1.44 mi. Contr. W-136-1-14, Worcester Co., to Waller & Phillips, Salisbury, $23,067. **P.W.A.** Bids Mar. 13. Noted Mar. 8.

Maryland—State Roads Comn., Baltimore, concrete paving 1.32 mi. Church Hill-Price Rd., Contr. Q-96-1-22, Queen Anne Co., to Phillips Bros., Salisbury, $20,930; macadam paving 0.89 mi. Fairview Cearfoss Rd., Contr. N-142-1-62, Federal Aid Project N.R.S. 325, Washington Co., to Bester Long Co., Hagerstown, $13,992. **P.W.A.** Bids Mar. 20. Noted Mar. 15.

Massachusetts—Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, bituminous macadam surfacing and widening 48,148 ft. N.R.A. Project R-26, Charlemont, to Kelleher Corp., Turners Falls, $441,701. **P.W.A.** Bids July 10, awarded July 18. Noted July 5.

Michigan—State Hy. Dpt., Lansing, grading, shaping, drainage, concrete and 2 course gravel paving 1.098 mi. N.R.S. 83-19 Contr. 1, Wexford Co., to Lewis & Frisinger Co., Ann Arbor, $24,231.

Michigan—State Hy. Dpt., Escanaba, grading, shaping, drainage structures, concrete paving 0.729 mi. N.R.H. 22-28, Contr. 2, Dickinson Co., to H. Holmes, Crystal Falls, $29,437; 0.233 mi. Contr. 19-18C-3, Clinton Co., to R. Hudson, Bennington, $15,815.

Minnesota—State Hy. Dpt., St. Paul, improving 1.3 mi. S.P. 36-118-20-1 NRS 464-B, incl. 219,300 cu.yd. excav., to Lobnitz Bros., Willmar, $37,932; S.P. 36-118-21-2, NRS 464-A, 72,000 cu.yd. excav., to Park Constr. Co., 1405 11th Ave. S., Minneapolis, $20,806. Bids June 29.

Missouri—State Hy. Dpt., Jefferson City, graveling 0.658 mi. road near Marthasville, Sects. 401 A and B, Warren Co., to Davis Constr. Co., Boonville, $30,806 and $1,677 respectively***concrete widening 0.085 mi. road in Poplar Bluff, Sects. 207C and 207D, Butler Co., to Regenhardt Constr. Co., Cape Girardeau, $2,949 and $93,199 respectively***0.399 mi. Buchanan Co., to Harrison Constr. & Eng. Co., Fairfax Bldg., Kansas City, $26,802***0.442 mi. Linn Co., to G. Knutson, 3520 Main St., Kansas City, $37,165***oiling 86.73 mi. Franklin, St. Charles, St. Francois and St. Louis Counties, to Rock Hill Asphalt Co., Clayton, $12,467. Grand total $205,065. Bids June 15.

Missouri—State Hy. Dpt., Jefferson City, to Richmond Constr. Co., Advance, graveling 0.514 mi. Risco-Gideon Rd., Sect. 1B, New Madrid Co., $866; 3.978 mi. Sect. 1A same road, $6,735***to S. G. Hayes & Co., Jefferson City, 0.572 mi. Marion Co., $817; 0.507 mi. Lewis Co., $726; bituminous material surfacing 4.735 mi. Kirksville-Edina Rd., Sect. 48A, $11,745; 4.913 mi. Sect. 49A same road, $12,754, both Knox Co.; 2.954 mi. Sect. 45C, same road, $7,160; 4.681 mi. Sect. 44B, $11,682; 4.992 mi. Sect. 43B same road, $12,595, all foregoing Adair Co.***to Rock Hill Asphalt & Constr. Co., Clayton, 10.6 mi. Ste. Genevieve Co., $7,785; 2.562 mi. Jackson-Morley Rd., Sect. 2 A, $9,484; 4.992 mi. same road Sect. 13A, $18,341; 4.614 mi. Sect. 14B, same road, $17,461, all foregoing Scott Co.; 1.383 mi. Sect. 28A same road, $2,556; 1.426 mi. Sect. 1A same road, $5,378; 4.57 mi. Sect. 26B, same road, $16,406; 4.062 mi. Sect. 25B same road, $14,731, all foregoing Cape Girardeau Co.***to Hobson Bros., Northview, graveling 3.685 mi. Montier-Jacks Forks Rd., Sect. 1B, $2,850; 2.996 mi. Bartlett-Alley Spring Park, Sect. 3A, $2,252, both Shannon Co.; 1.621 mi. Edge Hill-Iron Co. Rd., Sect. 3B, $1,018; 2.792 mi. Centerville-Black Rd., Sect. 4B, $1,687; 0.295 mi. same road Sect. 2C, $179, all foregoing Reynolds Co.***to Porter-DeWitt Constr. Co., Kirkwood, graveling 3.03 mi. Storr-Route 51 Rd., Sect. 3A, $3,766; 2.288 mi. Route 51-Route C, Sect. 1A, $2,324, both Bollinger Co.; 3.026 mi. Glencoe-Eureka Rd., Sect. 2, St. Louis Co., $10,499; 4.58 mi. Wayne Co., $3,801***to J. L. Pohl, Nevada, 288 mi. Stover Rd. S., Sect. 1A, $3,139; 3.086 mi. Sect. 2A same road, $3,403; 3.908 mi. Sect. 3A same road, $4,021, all foregoing Morgan Co.***to Imperial Trucking Corp., Hickman Mills, 5 mi. Versailles Rd. S., Sect. 56A, $10,330; 3.011 mi. Sect. 57B same road, $9,248; 3.42 mi. Sect. 58A same road, $10,384***to Henderson Constr. Co., Richmond, 3.429 mi. Ray Co., $4,123; 4.1 mi. Randolph Co., $2,188; 2.007 mi. Avalon-Bedford Rd., Sect. 2A, $762; 2.727 mi. Sect. 1A same road, $1,047***to Samples & Elsea, Kirksville, 3.881 mi. Montgomery Co., $18,098; 0.706 mi. Putnam Co., $428; 2.44 mi. Charlton Co., $2,140***to W. J. Menefee Constr. Co., Sedalia, 2.746 mi. Darien-Route 19 Rd., Sect. 2B, $3,226; 2.841 mi. same road Sect. 1B, $3,326; 2.5 mi. Sect. 1B same road, $2,933; 2.899 mi. Joy-Darien Rd., Sect. 2B, $3,401, all foregoing Dent Co.; 2.859 mi. Boone Terre-Old Mines Rd., Sect. 3A, $3,046; 2.943 mi. Sect. 4A, same road, $3,150, both St. Francois Co.; 4.414 mi. Sect. 1A, same road, $4,717; 4.107 mi. Sect. 2A same road, $4,377, both Washington Co.***to Dietz-Hill Development Co., Kansas City, 1.48 mi. Dover Sta.-Route 24 Rd., Sect. 1A, Lafayette Co., $2,855; 2.521 mi. Sect. 1A same road, $4,878***to C. E. Rich & Co., Troy, graveling 3.013 mi. Scott Co., $2,130***to E. F. Delaney, Holcomb, 4.117 mi. Dunklin Co., $8,426***to Service Constr. Co., Poplar Bluffs, 2.264 mi. Butler Co., $1,959 ***to Carte Harlin Constr. Co., West Plains, 0.366 mi. Crawford Co., $4,442***to F. T. O'Dell, Hannibal, 3.772 mi. Ralls Co., $3,952 ***to E. W. Jewett, Shelbina, 3.834 mi. Marion Co., $2,288***to Edmondson & Doty, Cassville, 4.578 mi. Pulaski Co., $4,595***to M. E. Gilioz, Monett, 1.545 mi. Pulaski Co., $40,179 ***to Webb Boone Paving Co., 5103 Fyler St., St. Louis, asphaltic concrete paving 4.002 mi. St. Louis Co., $31,192. Grand total $397,981. Rejected bids road in Laclede Co. Bids July 6. Noted June 28.

Mo., St. Louis—Director Streets & Sewers filling up and repaving cuts and bridges in various streets in southwestern and northwestern sections of city, day labor. $27,930.

Mo., St. Louis—City, removing wood block paving on Olive, Pine and Locust Sts. between 4th St. and 12th Blvd. and asphaltic concrete repaving various streets, day labor. **Maturity late in summer and early fall.** $1,050,000. L. A. Pettus, city engr.

Nevada—State Hy. Comn., Carson City, grading, draining, crushed graveling 4.77 mi. road between Lovelock and point 5 mi. east, Pershing Co., to Union Paving Co., Call Bldg., San Francisco, Calif., $66,649. **P.W.A.** Bids July 6.

New Hampshire—State Hy. Dpt., Concord, 4 in. on 11 in. gravel paving 27,033 cu.yd. Connecticut Valley Rd., Cornish and Plainfield, Sullivan Co., to Lane Constr. Corp., 37 Colony St., Meriden, Conn., $67,992. Est. $75,000. Bids July 12. Noted July 5.

New Mexico—State Hy. Comn., Santa Fe, improving State Project 812, Lea Co., to Dudley Stone Products Co., El Paso, Tex., $36,906 est. $30,000***FAP23, 97A, B, C and D, DeBaca Co., to Cook & Ransom, Ottawa, Kan., $38,925 est. $30,000***F.A.P. 29, Eddy Co., to Armstrong & Armstrong, Roswell, $33,834 est. $30,000***NRS 201-B and 203-C, San Juan Co., to Kirchhof-Hanes, Inc., P. O. Box 833, Albuquerque, $10,166 est. $7,875***NRM 133 and 168-B, Silver City, to Hayner & Burn, Las Cruces, $60,959 est. $67,366***N.M. D.L.H. P 2A and 2B, Valencia Co., to Capital Constr. Co., Santa Fe, and Dudley Stone Products Co., El Paso, Tex., $87,545 est. $93,000. Grand total $268,335. Bids July 19. Noted July 12.

New York—State Hy. Dpt., Albany, preliminary bituminous treated surfacing 4.6 mi. in Erie Co., to P. J. Knickenberg, Buffalo, $405,244 est. $450,720; concrete surfacing 5.42 mi., 0.55 mi. and 4.87 mi. in Onondaga Co., to G. B. Dickison, Inc., 309 Basin St., Syracuse, $103,087. Bids June 29.

N. Y., Brooklyn—R. V. Ingersoll, pres. Richmond Boro, Boro Hall, to C. F. Vachris, Inc., 827 Remsen Ave., sewer in Avenue L, $139,972 ***to Manmill Constr. Co., 1780 Pitkin Ave., in Lancaster Ave., $7,987; Batchelder St., $6,451 ***to Matarazzo & Yondola, 1163 61st St., Brown St., $27,463. Grand total $181,873. Bids July 13. Noted July 5.

N. Y., New York—J. J. Lyons, pres. Bronx Boro, Crotona Park, County Bldg., 161st St. and Concourse, to F. Mascali & Son, 645 East Tremont Ave., grading Bronxwood Ave. $30,796 ***Fteley Ave. $3,022; Arnow Ave. $11,803; Edson Ave. $10,282; Tiemann Ave. $10,165; East 232nd St. $7,542***to Melrose Excavation Co., 294 East 156th St., Barker Ave. $17,010; Secor Ave. $14,591; Waring Ave. $6,683***to C. L. Beckwith, Inc., Seneca Ave. and Edgewater Rd., asphalt paving Chatterton Ave. $9,077; Adee Ave. $4,725. Grand total $125,696. Bids July 11. Noted July 5.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, repaving Bay St., to J. E. Donovan, 2205 Richmond Terrace, Port Richmond, $38,050; grading Winant St., to Certified Constr. Co., 287 Bway., West New Brighton, $846. Bids July 3. Noted July 5.

N. Y., St. George—J. A. Palma, pres. Richmond Boro, Boro Hall, grading Morningstar Rd., to Vanbro Constr. Co., $31,991***sewer in Crafton Ave., to Trufoglio Constr. Co., 390 Cary Ave., Port Richmond, $16,179. Bids July 11. Noted July 5.

N. Y., Tarrytown — Hy. Impvts., Greenburgh, improving Fulton and White Plains Aves. and Fulton St. South, to Molloy & Murray Contg. Co., 144 Saw Mill River Rd., Yonkers, $76,636***Old Tarrytown and Stadium Rds., to Peckham Road Corp., 47 Mamaroneck Rd., White Plains, $21,892*** Central Park and Washington Aves., to L. Petrillo, 1 Edison Ave., Mount Vernon $24,502 and $75,711 respectively. Grand total $198,741. **P.W.A.** Bids June 28.

Pennsylvania—At office S. S. Lewis, secy. Hys., Harrisburg, bit. penetration or Spec. "E" on native stone base surfacing 2.03 mi. Route 168, Ext. Sect. 1, Dunmore and Throop Boroughs, Lackawanna Co., to Freeland, MacHale & Patten, Inc., 1 Penn Ave., Pittsburgh, $48,295. Bids June 15. Noted June 7.

†**R. I., Bristol**—Lighthouse Service, Chelsea, Mass., concrete paving at Lighthouse Depot, to E. R. Riccardelli, 199 Lexington St., East Boston, Mass., $1.750 plus $1.85 per sq.yd. for extra paving. Bids June 20, awarded July 16.

R. I., Providence—City, Bd. Contr. & Supply City Hall, bituminous macadam paving various streets, to T. J. Quinn & Son, Inc., 95 Fountain St., $71,134; Pocasset Ave., to M. A. Gammino Constr. Co., 728 Valley St., $39,196. Awarded July 17.

South Dakota—State Hy. Comn., Pierre, to C. A. Wagner Constr. Co., Sioux Falls, grading 12.144 mi. Lake Co. $36,854***to Dies, Fick & Cooney, Onaka, 5.055 mi. Faulk Co., $15,580; 11.269 mi. Potter Co. $17,767***to F. Liebsch, Arlington, 3.392 mi. Stanley Co. $12,132***to Smith & Marlin, Gering, Neb., 9.877 mi. Todd Co. $28,820; 5.158 mi. Tripp Co. $18,151***to Jarvis, Wright & Howell, Sioux Falls, 5.517 mi. McCook Co. $12,585***to S. J. Morrissey, Summit, graveling 9.569 mi. Beadle Co. $6,474; 7.036 mi. Mellette Co. $6,516***to Lee & Johnson, Inc., Sioux City, 6.78 mi. McPherson Co. $6,462; 10.259 mi. Edmunds Co. $9,115***to Lindekugel & Kolberg, Spencer, 3.003 mi. Lay Co. $2,880***to E. Bradley, Wagner, 8.443 mi. Lake Co. $13,485***to Willis Lindekugel, Spencer, 4.410 ft. guard rail, Hutchinson Co. $1,427; 2,420 ft. in Codington Co. $782; 840 ft. in Charles Mix Co. $271; 840 ft. in Bone Homme Co. $279; 9,210 ft. Hughes Co. $3,005; 710 ft. Clay Co. $235. Grand total $192,820. Bids July 11.

Washington—State Hy. Comn., Olympia, concrete paving 9.597 mi. Clallam Co., to Erickson Paving Co., 1650 North 34th St., Seattle, $187,807***grading, crushed stone surfacing 15.272 mi. Grays Harbor and Pacific Counties, to R. O. Dail-Warren Bros., Aberdeen, $174,856 ***bituminous macadam surface treating 17.9 mi. Whitman Co., to J. C. Compton, McMinnville, Ore., $49,888***bridge, Chelan Co., to T. D. MacNeil, Mount Vernon, $40,610. Grand total $453,161. Bids July 10. Noted June 28.

Wash., Waterville—Douglas Co., constructing 4.16 mi. Secondary Hy., to L. Colucci & Co., 1415 Lane St., Seattle, $21,950. Bids June 26 awarded July 20.

Wash., Wenatchee—Comrs., Chelan Co., grading, crushed stone surfacing 10,500 cu.yd. Secondary Rd. 10, to Goodfellow Bros., Wenatchee, $26,081. Bids July 17. Noted July 3.

West Virginia—State Rd. Comn., Charleston, improving roads in Tucker Co., to A. J. Marshall Co., Elkins, $22,498***Raleigh and Wyoming Counties, to Southern Oil & Tar Co., Louisville, Ky., $21,880***Putnam and Mason Counties, to Murphy Constr. Co., Morgantown, $18,170 and $26,431 respectively***Monongalia Co., to Weirton Constr. Co., Weirton, $81,046*** bridge in Ohio Co., to C. L. Moore, Lowellville, O., $62,624. Grand total $232,549. Bids July 17. Noted July 12.

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†*Federal Government.*

Streets and Roads (Continued)

Wisconsin—State Hy. Comn., Madison, grading, draining, 14.163 mi. road in Vilas and Forest Counties, to Dixon Constr. Co., Albany, $61,510***concrete surfacing 4.51 mi. Calumet Co., to Lampert & Pampert, Oshkosh, $108,671. Bids July 11 and 17.

EARTHWORK, IRRIGATION DRAINAGE AND WATERWAYS

PROPOSED WORK

Calif., Modesto—Modesto Irrigation Dist. plans concrete canal lining and constructing irrigation structures, $165,000; also constructing 2nd circuit on transmission line between Don Pedro Power House and Station A, $60,000. P.W.A. loan and grant.

†Colorado—Uncompahgre Valley Water Users Assn., Gunnison, plans constructing Taylor Park Dam, and improving, extending canal system. $2,000,000 P.W.A. funds allotted. R. F. Walter, ch. engr. Bureau Reclamation, Denver, engr.

†Illinois—U. S. Eng., Post Office, Chicago, bids in about 3 weeks, dredging 8,000,000 cu.yd. common earth from Lower Illinois River from Mile 11.2 near Hardin to Mile 229.3 near Starved Rock.

†Indiana and Illinois—U. S. Eng., Chicago, Ill., bids in about 4 weeks dredging 120,000 cu.yd. in Indiana Harbor Canal, Ind.; furnishing, delivering 3,000 tons rip rapping for Michigan City and Waukegan Harbors.

Ind., Linton—Bd. Comrs. Green Co. making plans 4 mi. drainage ditch in Washington Twp. $15,000. J. T. Fritz, Linton, engr.

Mich., Detroit—Port of Detroit Comn., W. Bradley, chn., City Hall, submitted plan to Port Commission for river front development as part of port development, incl. extending harbor line into Detroit River 230 ft. beyond present limit from 2nd Blvd. to Randolph St. with concrete sea wall at proposed new harbor line and 150 ft. pavement on the fill. $3,300,000. J. P. Hallihan, Water Bd. Bldg., engr. Noted Sept. 7.

Nebraska—Platte Valley Public Power & Irrigation Dist., H. Williams, pres., Gothenburg, plans dam, canals, and hydro-electric plant, diversion dam in North Platte River, 2¼ mi. west of Keystone; 45 mi. canal to reservoir site 4 mi. south of Sutherland; 140,000 acre-ft. 28 mi. canal to reservoir site south of North Platte; 34,000 acre-ft. 4 mi. canal to hydro-electric plant site, 4 mi. south of North Platte; 1.5 mi. canal to Fremont Slough. Soon takes bids on test borings. $7,500,000. P.W.A. project. D. D. Price, North Platte, engr. Noted Mar. 2, 1933.

Neb., Columbus—Loup River Public Power Dist., C. B. Fricke, pres., plans constructing 800 ft. concrete and short earth diversion dam in Loup River, 3.5 mi. west of Genoa; 3.6 mi. canal to Beaver Creek; 8.4 mi. high line canal to Monroe Power plant; 8.3 mi. tail race. Looking Glass Reservoir of 750 acres; Monroe Reservoir, 110 acres; Reservoir 1, 1,000 acres; Reservoir 2 of 200 acres. Columbus plant with three sixteen 500 hp. turbines, transmission lines to Sioux City, Omaha and Lincoln. $7,300,000. P.W.A. project. F. Albert, Columbus, engr. Harza Eng. Co., 20 North Wacker Dr., Chicago, Ill., consult. engr.

†North and South Carolina—U. S. Eng., Charleston, S. C., plans continuing work Inland Waterway between Cape Fear, N. C., and Winyah Bay, near Georgetown, S. C. $650,000 allotted for same.

Tex., Edinburg—Hidalgo Co., c/o E. C. Couch, judge, plans irrigation canals. P.W.A. approved $1,769,000 allotment. Noted Nov. 2.

Tex., Fort Worth—Tarrant Co. Water Control & Impvt. Dist. 1, c/o W. R. Bennett, pres., Fort Worth, plans enlarging and remodeling levee system of District on Clear Fork of Trinity, West Fork above and below Junction. P.W.A. approved $315,000 allotment. Hawley, Freese & Nichols, Capps Bldg., engrs.

Tex., Orange—Orange Co. Conservation & Reclamation Dist., c/o C. C. Leedy, chn., plans dredging bayous and creeks. P.W.A. approved $378,000 allotment. F. Schutts & Sons, Orange, engrs.

Tex., Orange—Orange County Water Co., c/o C. C. Leedy, agt., plans pumping plant and system to irrigate 40,000 acres in Orange Co. P.W.A. approved $489,000 allotment. W. B. Gregory, Tulane Campus, New Orleans, La., engr.

Tex., Palacios—City, c/o D. Ruthvan, mayor, plans seawall repairs. P.W.A. approved $141,000 allotment. Southwestern Eng. Co., Littlefield Bldg., Austin, engrs.

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Tex., Texas City—Galveston Co., c/o E. B. Holman, judge, Galveston, plans seawall. P.W.A. approved $127,000 allotment. G. C. Washington, Galveston, co. engr. Noted Jan. 18, under "Galveston."

Wash., Seattle—Bd. P. Wks., rejected bids timber piling for Railroad Ave. project. Will readvertise.

Ont., Toronto—I. G. Langton, genl. mgr. Toronto Harbour Comn. Bd. soon takes bids pile concrete dockwall in Toronto Bay, south of Ship Channel.

Que., Quebec City—Quebec Harbor Comrs., preparing plans for new quay wall for Pier 1 West Side. $730,000.

Que., St. Lamberts—City preparing plans and soon takes bids retaining wall. $45,000.

BIDS ASKED

†Ark., Manila—Aug. 14, by Dpt. Agriculture, Wash., D. C., constructing, ditch, earth fills, and embankments, timber spillways for Big Lake Bird Refuge.

Fla., Atlantic Beach—Aug. 6, by Town Council, at office Hills & Youngberg, engrs., 1604 Lynch Bldg., Jacksonville, 5,651¼ ft. rein.-con. seawall, complete with stairways and backfill and 2 ramps of runways at easterly ends of 7th and 15th Sts.

Mass., Winthrop—July 31, by Commonwealth of Massachusetts, Dpt. P. Wks., F. E. Lyman, comr., 100 Nashua St., Boston, extending stone breakwater in Broad Sound off Winthrop Shore Dr. involving 35,000 tons heavy stone riprap. $80,000 appropriated.

Que., Riviere Ouelle—July 31, by Secretary Dpt. P. Wks., Ottawa, wharf reconstruction, taking off old cribwork, involving 2,960 cu.yd. 190 tons steel sheet piling, 24½ tons coppered steel angles and channels, 9 tons coppered steel tie rods, 5,800 cu.yd. stone backfilling, 800 sq.yd. bituminous macadam pavement, etc. $40,000. K. M. Cameron, Ottawa, Ont., engr.

CONTRACTS AWARDED

†California—U. S. Eng., Post Office, Sacramento, constructing 9.6 mi. levee on north side Simmerly Slough, etc., Spec. 5976, to Swinyer Constr. Co., 219 Sierra Madre Ave., Pasadena, $45,448. Bids July 10, awarded July 20.

†Louisiana—U. S. Eng., Vicksburg, Miss., 644,000 cu.yd. levee work, Items 200 L, N and O, to J. Hendrix, Alexandria, 13.45c. per cu.yd.; Item 200M, to Forcum-James Co., Dyersburg, Tenn., 17.44c. per cu.yd. Est. $106,448. Bids July 10. Noted June 28.

†Montana—U. S. Eng., Kansas City, Mo., steel sheet cutoff wall at Fort Peck Dam, to C. Locke Tarlton Co., Ambassador Bldg., St. Louis, Mo., and to Frazier-Davis Constr., 1319 Macklind Ave., St. Louis, Mo., $2,200,000. Bids July 9. Noted June 21.

†Va., Norfolk—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending sea walls, to C. J. Lindemann, 4005 Gosnold Ave., $3,700. Bids June 29. Noted June 21.

N. S., Brooklyn—Secretary Dpt. P. Wks., Ottawa, Ont., dredging, to Southern Salvage Co. Ltd., Liverpool, $20,046. Est. $24,000. Noted July 5, under "Nova Scotia."

Ontario—Secretary Dpt. P. Wks., Ottawa, dredging at Belleville to Randolph MacDonald Co., Toronto, at 32c. per cu.yd. total, $11,128 est. $15,000***dredging in Oakville, to C. S. Boone Dredging & Contg. Co. Ltd., 330 Bay St., Toronto, $17,660. Est. $18,000.

Ont., Kingsville—Dpt. P. Wks., Ottawa, dredging Kingsville Harbour and Pelee Island, to Canadian Dredging Co. of Canada, Ltd., Harbour Comn. Bldg., Toronto, at 44c. per cu.yd. Total $16,000. Est. $12,000.

Ont., Port Stanley—Secretary Dpt. P. Wks., Ottawa, K. M. Cameron, engr., Ottawa, protection wall, and pier, and revetment wall, to Cameron & Chin, Welland, $8,295 and $13,752 respectively, est. $15,000 and $28,000 respectively. Noted July 5, under "Ontario."

FEDERAL POWER COMMISSION

Applications for Licenses and Permits

Licenses

1273—Parowan City, Utah, wants license to construct power project on Center Creek in Iron Co.

1274—Montana Power Co., Butte, wants license constructed power project on Madison River, in Gallatin and Madison Counties.

1275—N. M. Leoni, Lemoore, Calif., wants license partly constructed power project on North Fork Merced River, Mariposa Co.

1276—Ancho-Erie Maining Co., Granite Co., Calif., wants license power project, completed except for minor changes and repairs on south fork Poorman Creek, in Nevada Co.

UNCLASSIFIED

PROPOSED WORK

California—OIL DEVELOPMENT—Dome Oil Co., E. B. Milburn, pres., 1812 Courtney Ave., Los Angeles, plans oil drilling development. To exceed $100,000.

Calif., Modesto—ELECTRIC DISTRIBUTING SYSTEM—Modesto Irrigation Dist. plans purchasing and improving electrical distributing system of Pacific Gas & Electric Co., 245 Market St., San Francisco, to operate within district's boundaries. Approximate purchase price $225,000.

Calif., San Mateo—FIRE ALARM SYSTEM—City, E. P. Wilsey, mgr., plans election to vote bonds for fire alarm system extensions, about 145 boxes. $25,000.

Calif., Stockton—GAS CONTAINERS—Pacific Gas & Electric Co. plans reconstructing gas containers, destroyed by fire.

Ill., Joliet—COAL POCKETS, etc.—Webb & Gray Coal Co. plans coal pockets and yards, $40,000. Architect not appointed.

Kan., Parsons—GAS SYSTEM—Local voters will decide on Aug. 7, whether the city shall issue $75,000 in bonds to finance construction of municipal gas system.

Mich., Bay City—OIL TERMINAL—Thiesen-Clemens Co., St. Joseph, making plans oil terminal, incl. two 37,500 gal. tanks and one 55,000 gal. tank, steel construction on concrete founds., concrete, timber dock for boat shipments, pump house and loading dock for cars and trucks, brick and concrete office building, at Grand Trunk Terminal Ry., and Saginaw River. $75,000. W. J. Shortell, St. Joseph, engr.

Mo., Carthage—SWIMMING POOL—City, K. E. Baker, mayor, bids early in fall, municipal swimming pool, and parking improvements, $71,326. $18,500 grant allotted by P.W.A. E. S. Glenn, city engr. Noted Jan. 4.

N. Y., Brooklyn—COMFORT STATION—Dpt. Parks, Arsenal Bldg., Central Park, New York, soon takes bids 2 story, 20 x 32 ft. and 29 x 80 ft. comfort station, 27th Ave. $40,000.

N. Y., Brooklyn—UNDERGROUND STORAGE TANKS, etc.—Nelson Bros. Coal Co., 398 Hamilton Ave., plans by M. T. Ketz, 125 West 14th St., New York, underground storage tanks and bulk station, Smith and Creamer Sts. $35,000.

North Carolina—TELEPHONE LINE—Half Circle B Ranch, C. A. Bauman, Fairview, plans 5 mi. telephone line at Half Circle B Ranch on Cane Creek Rd. between Fairview and Fletcher, 12 mi. from Asheville.

N. C., Fayetteville—ELECTRIC DISTRIBUTION SYSTEM—City, Q. K. Nimocks, mayor, plans electric distribution system. $35,000. P.W.A. loan approved. E. W. Olsen, Tarboro, engr.

Rhode Island—RACE TRACK, etc.—Syndicate, c/o P. S. P. Randolph, Point Judith, and L. Smith, c/o Rockingham Track, Salem, N. H., preliminary plans race track, stables, etc., Diamond Hill, Cumberland County. Est. about $1,000,000.

S. D., Brookings—SWIMMING POOL—City plans swimming pool and bath house. $28,000 P.W.A. loan and grant allotted. Perkins & McWayne, 322 Paulton Blk., Sioux Falls, engrs.

Texas—OIL PIPE LINE—Corporation, c/o Gulf Oil Corp., Houston, plans 75 mi. oil pipe line from Keeran Oil Fields to Ingleside. **Maturity indefinite.**

Tex., Houston—GAS SYSTEM—City, c/o A. F. Holcombe, mayor, plans gas system improvements, eliminating leaks of existing system and additional mains, valves and boxes. P.W.A. approved $92,000 allotment. J. M. Nagle, city engr. Noted Dec. 21.

Tex., San Antonio — STADIUM — Standard Assn., c/o H. Winters, 2223 North St. Marys St., plans by Phelps & De Wees, Gunter Bldg., A. B. and R. M. Ayres, Smith-Young Tower Bldg., steel, concrete athletic stadium, having 8,000 seating capacity; also plans baseball diamond track for runners, tennis and other sports. $100,000. Willard Simpson & W. C. Lilly, Smith-Young Tower, engrs.

Alta., Calgary—TRACK RECONSTRUCTION—R. A. Brown, supt. City Utilities, plans reconstructing track and relaying present 60 lb. rail with 102 lb. rail.

†Federal Government.

Unclassified (Continued)

Alta, Edmonton—AIR CLEANING PLANT—Cadomin Coal Co. plans air cleaning plant. $55,000.

Man., St. Clements—ELECTRIC POWER LINE—Winnipeg, Selkirk & Lake Winnipeg Railway Co. plans electric powerline. **Maturity this summer.**

Ontario—RAILROAD—Canadian Govt. Dpt. Transportation, Ottawa, plans railroad between Lake St. Joseph to Lac Seur, and terminals, etc. To exceed $100,000. **Maturity indefinite.**

Ont., Welland—RAILWAY SPUR—Canadian Atlas Steels Ltd. soon takes bids railway spur, 80 ft. extension to melting furnace building, installation of oil fixed billet heating furnace, heat treating furnace, and other metallurgical control equipment.

Que., Montreal—WHARF—Harbour Comrs. soon takes bids heightening wharf, facing Sections 38, 39 and 40. $242,000.

Que., Murray—WHARF—Dpt. P. Wks., Ottawa, Ont., soon takes bids wharf, $156,000.

Que., Quebec City—GRAIN ELEVATOR BINS—Quebec Harbor Comrs. soon take bids for repairs to concrete surfaces of storage bins of grain elevator. $75,000.

Que., Sorel—WHARF REPAIRS—Dpt. Marine, Ottawa, Ont., preparing plans for repairs to wharf. Est. $100,000.

BIDS ASKED

†Calif., San Francisco — CONVERTING LIGHTSHIP—Aug. 7, by Superintendent Lighthouses, Custom House, converting Lighthouse Ship 83 from coal burner to an oil burner, replacing boilers, constructing fuel oil tanks, replacing boilers, Proposal N-15.

†T. H., Pearl Harbor—ELECTRICAL DISTRIBUTION SYSTEM—Yards & Docks, Navy Dpt., Wash., D. C., taking bids electrical distribution system, Spec. 7604. (Date not set.)

N. Y., Brooklyn—STATION FINISH—Aug. 7, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., constructing station finish for York St. Station, on part of Rapid Transit r.r. extending along and under Rutgers St. and Rutgers Slip, Manhattan Boro, under and across East River and along Jay St., Brooklyn Boro, from Madison to Nassau Sts., incl. ventilation building and compressor room.

N. Y., New York—TRACKS, etc.—Aug. 7, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., installing tracks and contact rail for part of Rapid Transit Railroad, Route 108, Sects. 5, 6, 7 and part of Sect. 8, Queens Boro.

CONTRACTS AWARDED

Ark., Benton—GAS DISTRIBUTION, etc.—See "Public Buildings."

Calif., Fresno—TRUCK TERMINAL—Owner, c/o W. D. Coates, archt., Rowell Bldg., 150x150 ft. truck terminal on State Hy. to C. J. McIntyre, 774 Elizabeth St., $35,750. Awarded July 7. Architect preparing plans.

Calif., Oakland—TUNNEL—Directors Joint Hy. Dist. 13, 1448 Webster St., exterior concrete structures for Broadway Low Level Tunnel and appurtenant structures, to N. M. Ball, 1889 Yosemite Ave., Berkeley***exterior excavation, to H. W. McKinley, 1326 North Central Ave., Glendale***temporary buildings, to W. E. Lyons, 357 Hobart St.***portal buildings, to K. E. Parker Co., 135 South Park, San Francisco***electrical and mechanical work, to Alta Electric & Mechanical Co., 467 O'Farrell St., San Francisco. Noted May 31.

†Calif., San Diego—HANGARS—Yards & Docks, Navy Dpt., Wash., D. C., 7 landplane hangars, Spec. 7295, to H. M. Hodges, trading as Los Angeles Contg. Co. and C. J. Wopschall, 4816 West Pico Blvd., Los Angeles, $238,550. Bids July 11. Noted June 21.

†Calif., San Rafael—RUNWAY—Con. Q.M., Hamilton Field, 6 in. compacted rock base runway with asphalt armor coating at Hamilton Field, to Pacific States Constr. Co., Call Bldg., San Francisco, $40,268. Bids June 29, awarded July 14. Noted June 22.

Ill., Chicago—STREET LIGHTING SYSTEM—City, furnishing, installing, operating and maintaining gas and gasoline street lighting equipment, etc., to American Development Co., 122 South Michigan Ave. Est. $130,000. Bids Mar. 28, awarded July 14. Noted Mar. 29.

La., Lake Charles — PIPE LINE, etc. — Mathieson Alkali Wks., Lake Charles, constructing pipe line, excavation, of ditches, 6 mi. pile driving for pipe line through marsh, to W. Horace Williams Co., Southern Bldg., New Orleans, approximately $250,000.

†Md., Baltimore—PASSENGER ELEVATOR—Treas. Dpt. at office Sup. Archt., Wash., D. C., changing type of operation of 1 passenger elevator, to Otis Elevator Co., 810 18th St., Wash., D. C., $4,272.

†Mass., Salem—SEA WALL—U. S. Coast Guard, 408 Atlantic Ave., Boston, Mass., reinf. con. seawall at Winter Island Coast Guard Station, to Marden Constr. Co., Inc., 46 Cornhill, Boston, $2,300. Bids May 28, awarded July 16. Noted May 17.

N. Y., Albany—TRANSIT SHED—Albany Dist. Port Dist., erecting Transit Shed 4, 110 x 400 ft., brick, steel, concrete, to H. J. Blessing, 1439 Western Ave., $67,527. Bids July 12.

†Wyo., Sheridan—GRILLES—Vet. Administration, Wash., D. C., furnishing, installing wire guard grilles on Veterans Hospital, to Flour City Ornamental Iron Co., 2637 27th Ave., Minneapolis, Minn., $17,833. Bids July 2, awarded July 11.

†T. H., Honolulu—STEEL SHELTERS—Aug. 14 by U. S. Eng., 6 steel shelters for fortifications for Hawaii Island delivered to Schofield Barracks, T. H., Brooklyn Transport Docks, and Fort Mason Docks, San Francisco.

MATERIALS AND EQUIPMENT

PROPOSED WORK

CRANE—**Fresno, Calif.**—City to provide budget funds to purchase clamshell crane for Municipal Garbage Dpt. $7,500. J. L. Vincenz, city comr. P. Wks.

MOTOR FIRE ENGINE—**Dinuba, Calif.**—Superv., Tulare Co. plans purchasing motor fire engine for use in rural areas of Dinuba. $3,000 or more.

MOTOR TRUCK—**Oroville, Calif.**—Butte Co., J. A. Baumgarner, engr., plans purchasing 1½ ton truck for Road Dpt.

STEEL TANKS—**Oroville, Calif.**—Butte Co. plans purchasing two 12,000 gal. gasoline storage tanks, and electric welder for County Road Dpt. J. A. Baumgarner, county engr.

†ROPE—**San Francisco, Calif.** — Con. Q.M. plans purchasing 17,000 lb. 3-strand manila rope.

ROAD OIL—**Alexandria, Ind.**—City Council plans purchasing road oil.

TANK—**St. Louis, Mo.** — Apex Petroleum Sales Corp., 7310 South Bway., applied for permit to install 1 additional 6,000 gal. underground tank for gasoline at 7310 South Bway.

TANKS—**St. Louis, Mo.**—Apex Oil Co., 1218 Olive St., applied for permit to install three 8,000 gal. underground tanks for gasoline at 3330 Market St.

TANKS—**St. Louis, Mo.**—Apex Petroleum Co., 7300 South Bway., plans installing three 15,000 gal. steel tanks for fuel oil at 7300 South Bway.

OIL SEPARATORS, etc.—**Cleveland, O.**—City, C. H. Cover, authorized purchase of and soon takes bids oil separators, stoker parts, 1 air ejector, lead covered cable, lanterns, standards, 4 oil pumps and distributing transformers.

BIDS ASKED

CAST IRON PIPE FITTINGS, etc.—**Gilroy, Calif.**—E. F. Rogers, city clk., taking bids c.i. pipe fittings, materials for construction of transmission waterline located within and without the city limits.

CABLE—**Los Angeles, Calif.**—Aug. 8, by D. P. Nicklin, purch. agt. Dpt. Water & Power, 207 South Bway., 44,900 ft. 500,000 CM 5,000 V. 3 conductor stranded, 3,000 ft. No. 6 A.W.G. 5,000 V, 2,500 ft. No. 6 A.W.G., 5,000 V, 21,000 ft. 4/0 A.W.G. 600 V, 10,000 ft. 1/0 A.W.G., 600 V, 20,000 ft. No. 4, A.W.G. 600 V conductor stranded and 12,000 ft. No. 6, W.A.G. 600 V. 1 conductor stranded, lead covered paper insulated cable, Spec. 1455. To exceed $2,000.

ROOFING SHEETS—**Los Angeles, Calif.**—Aug. 9, by D. P. Nicklin, purch. agt., Dpt. Water & Power, 207 South Bway., furnishing galvanized corrugated steel roofing sheets, Spec. 1468, as follows, 50 sheets 12 ft.x26 in., 1,720 sheets 10 ft.x26 in. and 2,470 sheets 9 ft.x26 in., 270 sheets 10 ft.x26 in., 120 sheets 8 ft. x26 in., 3,430 sheets 7 ft.x26 in., and 120 sheets 6 ft.x26 in. all 2 in. ga., **(a)** f.o.b. Camp sites, Mono Co., **(b)** f.o.b. cars bidders mill, **(c)** f.o.b. cars Los Angeles **(d)** f.o.b. cars Laws. To exceed $2,000.

AUTO PLATES—**Oakland, Calif.**—City Council taking bids furnishing 7,000 automobile license plates and approximately 14,000 inserts.

BOILER SETTING, etc.—**St. Charles, Ill.**—July 31, by C. H. Hammond, state archt., Capitol, Springfield, boiler setting, breeching, piping and electrical work at for Dpt. P. Wks. & Buildings, Springfield.

CALCIUM CHLORIDE, etc.—**Indiana**—Aug. 3, by J. D. Adams, chn. State Hy. Comn., 195 tons calcium chloride, f.o.b. Huntingburg, Dale, Boonville and Worthington; 500-1,000 tons crushed aggregate or gravel, State Rd. 45 between Loogootee and Bramble; 1,500-2,000 tons crushed aggregate, gravel f.o.b. plant; automobile and truck parts and miscellaneous hardware, f.o.b. Indianapolis.

ROCK ASPHALT, etc.—**Indiana**—July 31, by J. A. Adams, chn. State Hy. Dpt., Indianapolis, 3,500 tons rock asphalt f.o.b. North Manchester; 1,500-2,000 tons crushed aggregate f.o.b. Winslow; 1,000-1,500 tons gravel on Rd. 58; 1,400-1,800 tons crushed aggregate gravel or slag, f.o.b. Andrews; 6 in. well to be drilled at North Madison; 4,000-5,000 metal sign posts; quantity truck parts and hardware f.o.b. Indianapolis.

PILING, etc.—**Orange City, Ia.**—July 31, by M. J. Van Wgk. aud. Sioux Co., 3,028 lin.ft. creosoted piling; 18,461 ft. B.M. creosoted lumber; 60,000 ft. B.M. class D fir lumber. K. L. Seliger, Orange City, co. engr.

†DIESEL ENGINES—**New Orleans, La.**—Aug. 14, by Superintendent of Lighthouses, Custom House, diesel engines for lighthouse tender "Camellia."

STEEL PIPE—**Worcester, Mass.**—July 30, by City, W. Hudlund, supt. P. Buildings, 2,000 ft. 8 in. black wrought steel pipe in 20 ft. lengths, threaded and coupled for Coes Pond bathhouse.

LUMBER—**Minneapolis, Minn.**—July 31, by F. S. Gram, city purch. agt., City Hall, 41,334 bd. ft. Douglas fir for Bd. Educ. City Hall. Former bids rejected.

PATROL GRADER—**Stillwater, Minn.**—Aug. 7, by Washington Co., 1 motor patrol grader unit without tractor. J. F. Kilty, co. aud.

†WIRE STRAND, etc.—**Vicksburg, Miss.**—Aug. 1, by U. S. Eng., 500,000 ft. non-corrosive 3-wire strand; 60,000 squares non-corrosive wire fabric.

†DERRICK BOAT MACHINERY—**Kansas City, Mo.**—Aug. 2, by U. S. Eng., Postal Telegraph Bldg., machinery and parts for derrick boats, booms, bull wheel, swing engine, hoisting engine, etc. for Fort Peck Dam project.

†ELECTRICAL INSTRUMENTS—**Kansas City, Mo.**—Aug. 3, by U. S. Eng., Postal Telegraph Bldg., electrical instruments incl. 2 current measuring sets; 4 volt meters; 4 watt meters; 1 power meter; 1 cycle counter, 4 transformers; 8 voltage detectors; load testing device, insulators, etc., for Fort Peck Dam project.

†GRAVEL—**Kansas City, Mo.**—Aug. 6, by U. S. Eng., 8,000 cu.yd. gravel for railroad ballast.

†PUMPS—**Kansas City, Mo.**—Aug. 1, by U. S. Eng., Postal Bldg., 2 gasoline pumps for Fort Peck Dam project.

TRUCK—**Glasgow, Mont.**—Aug. 8, by Valley Co., F. J. Mersen, clk., one 4-4½ ton truck.

STONE, etc.—**Trenton, N. J.**—Aug. 1, by E. Mundy, acting state Purchase Comr., 38,200 tons crushed stone and 22,045 tons slag.

TRANSMITTER TUNING UNIT—**Brooklyn, N. Y.**—Aug. 17, by Signal Supply Officer, Army Base, 58th St. and 1st Ave., transmitter tuning unit.

LUMBER—**New York, N. Y.**—July 31, by Bd. Transportation, J. H. Delaney, chn., 250 Hudson St., lumber for Independent City-owned Rapid Transit Railroad System.

†PUMPS—**New York, N. Y.**—July 30, by Treas. Dpt. at office Sup. Archt., Wash., D. C., installing new spray pumps, at U. S. Custom House.

ASPHALT DUST, etc.—**Cleveland, O.**—City, bids after July 20, 400 tons asphalt dust, 1,500 sq.yd. medina paving blocks, 250,000 yards surface treating, 6,000 tons asphalt sand, 500 tons granulated slag, 600 tons asphalt cement, 400 tons asphalt filler, 600 cu.yd. ready mixed concrete, 2,000 lin.ft. sandstone curbing. $75,000.

ROAD OIL—**Cleveland, O.**—Aug. 7, by Bd. Comrs. Cuyahoga Co., G. Stahler, clk., 50,000 gal. road oil at 15c. per gal.

SOOT BLOWERS—**Cleveland, O.**—Aug. 3, by City, 6 soot blowers. F. H. Cover, City Hall, engr.

PUMPS—**Norwood, O.**—City Council in market new pumps for Waterworks Dpt. 2 pumps each 200 g.p.m. capacity.

STONE CHIPS, etc.—**Emaus, Pa.**—Aug. 6, by O. T. Iobst, boro secy., furnishing, delivering 75 tons stone chips, 600 to 900 tons ¾ in. slag, furnishing, delivering, applying 25,000 to 39,000 gal. tar. $7,000.

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†Federal Government.

Materials, etc. (Continued)

TANKS—Petrolia Pa.—Daugherty Refining Co., Petrolia, taking bids two 15,000 gal. steel, gasoline storage tanks. $3,000.

GASOLINE HOISTS—Phila., Pa.—C. O. Struse & Sons, Manayunk, Phila., taking bids 2 gasoline hoists 30 to 60 hp.

TRUCK CHASSIS—Selby, S. D.—Aug. 6, by Bd. Educ., Selby Independent Consolidated School Dist. 2, one 1½ ton truck chassis.

DIESEL ENGINE, etc.—Pierre, S. D.—Aug. 7, by City, N. W. May, aud., furnishing, installing 1 diesel oil engine 1,000 Bhp., 1 electrical generator, etc. R. Baker, city engr.

†GRINDER—Madison, Wis.—Aug. 13, by Dpt. Agriculture, Forest Service, Forest Products Laboratory, experimental pulpwood grinder with hydraulic and other auxiliary equipment.

†SEASONING CHAMBERS—Madison, Wis.—Aug. 10, by Dpt. Agriculture, Fort Service, constructing and installing 4 seasoning chambers and wind tunnel, also constructing and installing elevator for 30 ft. testing machine.

BOOSTER PUMP—Royal Oak, B. C.—R. F. Sewell, clk. in market for supply of 8 in. booster pump.

AIR COMPRESSOR, etc.—Wiarton, Ont.—Ormand Schwartz in market for supply of air compressor and tank and complete paint spraying equipment.

CONTRACTS AWARDED

FIRE HOSE—Eureka, Calif.—City, A. W. Kildale, city clk., 1,000 ft. 2½ in. double jacketed rubber lined fire hose, 50 ft. lengths with couplings, to Pioneer Rubber Mills, 353 Sacramento St., San Francisco, at $1.10 per ft. Awarded July 9. Noted July 5.

ASPHALTIC CEMENT—Los Angeles, Calif.—City, A. J. Holm, purch. agt., City Hall, 160 tons asphaltic cement f.o.b. cars or truck, 2445 McPherson St., and f.o.b. cars or trucks San Fernando Valley, to Richfield Oil Co., Richfield Bldg., $12.34 and $13.40 per ton respectively.

CAST IRON PIPE—San Francisco, Calif.—T. A. Brooks, city purch. agt., City Hall, 324 tons c.i. bell and spigot pipe fittings, 16 in. and under, to Enterprise Fdry. Corp., 2902-19th St., at 3.7c. per lb. Bids June 25, awarded July 17.

COAL TAR VARNISH LINING, CAST IRON PIPE, etc.—San Francisco, Calif.—T. A. Brooks, city purch. agt., City Hall, to National Cast Iron Pipe Co., 80,000 ft. 6 in. coal tar varnish lining at 60.5c. per ft.***to U. S. Pipe & Fdry. Co., Monadnock Bldg., 240,000 ft. 6 in. coal tar varnish lining at 61c. per ft., 32,500 ft. 12 in. cement lining at $1.72 per ft.; 48,400 ft. 16 in. cement lining at $2.74 per ft.***to American Cast Iron Pipe Co., Sharon Bldg., 78,000 ft. 8 in. coal tar varnish lining 91c. Bids June 15, awarded July 9.

STEEL ROLLING DOORS — San Francisco, Calif.—State Harbor Comn., Ferry Bldg., furnishing, installing 2 steel rolling doors on Pier 42, San Francisco waterfront, to Rolph Mills & Co., 525 Market St., $1,519. Bids July 5, awarded July 12.

SWIMMING POOL EQUIPMENT — Tracy, Calif.—Tracy Grammer School Dist., boilers, filters, pumps for swimming pool, to California Filter Co., 981 Folsom St., San Francisco, $2,650. Awarded July 17.

TILE ROOF DECK—Chicago, Ill.—Dpt. P. Wks., erecting flat arch hollow tile roof deck for Cermak Pumping Station, to U. S. Fireproofing Co., 228 North LaSalle St., $3,190. Bids June 11, awarded July 1. Noted June 7.

WOVEN WIRE FENCING—Chicago, Ill.—City, woven wire fence and gates at Springfield Ave. Pumping Station, to Lane Stewart Fence Constr. Co., 4842 West Kendzie Ave., $843. Bids Mar. 23, awarded July 17.

CRUSHED AGGREGATE, etc.—Indiana—State Hy. Comn., Indianapolis, 1,250 tons crushed aggregate, New Haven, to Blue Creek Stone Co., Decatur, $2,250; 2,500 tons gravel at Columbus, to E. T. Burnside, Shelbyville, $3,375. Bids June 28. Noted June 21.

CRUSHED AGGREGATE—Indiana—State Hy. Comn., Indianapolis, 2,000 tons crushed aggregate on Rd. 16, to Erie Stone Co., Bluffton, $3,000. Bids July 13.

GRAVEL, etc.—Indiana—State Hy. Comn., Indianapolis, 1,100 tons gravel at Uniontown, to Lingo Co., Brownstown, $1,199; 1,225 tons crushed aggregate at Goshen, to France Stone Co., Kenneth, $3,266. Bids July 11. Noted July 5.

ROCK ASPHALT—Indiana—State Hy. Comn., Indianapolis, 40 tons rock asphalt in Terre Haute, to Natural Rock Asphalt Corp., Heyburn Bldg., Louisville, Ky., $428. Bids June 22.

BRIDGE FLOOR MATERIAL—Covington, Ind.—Fountain Co., bridge floor material, to L. D. Hegg, Covington, $4,399. Bids July 10. Noted June 21.

ROAD OIL, etc.—Shelbyville, Ind.—City, road oil and rock asphalt, to Burke Constr. Co., Lafayette, $4,300. Bids July 3. Noted June 21.

SNOW FENCE, etc.—Iowa—State Hy. Comn., Ames, 64,000 lin.ft. Class A snow fence, to Wheeler Lumber Bridge & Supply Co., 606 Hubbell Bldg., Des Moines, $4,704***sixteen thousand one hundred 6½ ft. steel snow fence posts and 284 bundles of tie wires, to Barton-Warner Co., Sioux City, $6,101. Awarded July 16.

CULVERT PIPE—Mount Pleasant, Ia.—Henry Co., 1,600 lin.ft. corrugated culvert pipe, to Wheeling Corrugating Co., 100 Southwest 2nd St., Des Moines, $1,200. Bids July 16, awarded July 16. Noted July 10.

†BOLTS, etc.—Duluth, Minn.—U. S. Eng., machine bolts, to Zalk-Josephs Co., 300 East Michigan St., $101***steel plate washers, to Paper, Calmenson & Co., 975 East 7th St., St. Paul, $45***round steel rods, to Superior Iron Wks. Co., Superior, Wis., $340***ice guard spikes, to Scully Steel Products Co., 1319 Wabansia Ave., Chicago, Ill., $37. Grand total $523. Bids July 16.

†DRAGLINE LEVEE MACHINE, etc.—Vicksburg, Miss.—U. S. Eng., rental of one 1½-2 cu.yd. dragline levee machine; 4 tractors and wagons, 1 tractor and bulldozer for 50 working days, to J. W. Nobles, Fayette, Miss., $27,434. Bids July 3, awarded July 17.

CEMENT—Trenton, N. J.—Dpt. Institutions & Agencies, State Office Bldg., 700 bbl. cement for State Hospital, Greystone, to Lehigh Portland Cement Co., 51 East 42nd St., New York, N. Y., $1,526. Bids July 5, awarded July 16.

GUARD RAIL CABLE, etc.—Trenton, N. J.—State Purchasing Agent, guard rail cable, to American Cable Co., Wilkes Barre, Pa., $595; guard rail posts, to Wilson & Stokes, 651 South Broad St., $1,540. Bids July 9.

TANK—Seattle, Wash.—City Council, 50,000 gal. steel tank for Reflector bar, Diablo Power Project, to Western Eng. Corp., 5237 East Marginal Way, $6,705. Rejected bids hardware for transmission line.

†WOODWORKING EQUIPMENT — Madison, Wis.—Dpt. Agriculture, Forest Service, woodworking equipment for Forest Products Laboratory, to Yates American Machine Co., 912 West Washington Blvd., Chicago, Ill. Awarded July 12.

†STEEL CAISSON, etc.—Milwaukee, Wis.—Superintendent Lighthouses, 432 Federal Bldg., steel caisson for Green Bay Light Station and steel for deck for Grays Reef and Minneapolis Shoal Light Stations, to Lakeside Bridge & Steel Co., 3200 West Villard Ave., $7,695 and $13,831 respectively***fabricated steel for Grays Reef and Minneapolis Shoal Light Stations, to Worden-Allen Co., Port Washington Rd., $12,522. Total $34,078.

VALVES—Milwaukee, Wis.—City, J. A. Nicholson, purch. agt., 4 valves, to Western Gas Constr. Co., Fort Wayne, Ind., $1,086. Bids July 16, awarded July 19.

FOREIGN

Argentine, Buenos Aires—Aug. 27, by Administration of Argentine State Railways, vertical lathes.

Australia—Aug. 20, by Chairman State Electricity Comn. of Victoria, **Melbourne,** one 10,000 kva. oil immersed forced oil cooled, outdoor type 3 phase transformer***Aug. 28, by Deputy Director of Ports & Telegraph Dpt., **Melbourne,** supplying telephone relays of various types*** Aug. 29, by General Manager, New South Wales Railways, **Sidney,** supplying one 7,500 kw. steam turbines and spare parts.

Egypt, Cairo—Sept. 24, by Ministry of Interior, remodeling Assiut Barrage and Ibrahunia Head Regulator. Details from Coode, Wilson, Mitchell & Vaughn, Ltd., 9 Victoria St., London, England.

England—Morecambe Town Council bids soon for sewage scheme $715,000 voted***Fleetwood City Architct preparing plans municipal hall $151,150***Derby** Town Council awards contract 100 houses, to Harris Bros. Ltd., Marehay, $140,480, and police building, to Ford & Weston, Ltd., Derby, $244,975.

England—Swindon City Architect preparing plans for municipal buildings, $257,500***

Norwich City Architect preparing plans [illegible] municipal building $1,322,500***Portsmouth** City Council awarded contract addition to hospital, to Howe & Bishop, Ltd., Portsmouth, $244,750*** Dalton Main Colliery, Ltd., Dalton, preparing plans reconstructing ovens and products plant, $500,000***Chesterfield** Electrical Engineer preparing plans extending Brampton Power Station, increasing capacity from 6,800 kw. to 16,800 kw., incl. turbine house addition, steel, corrugated iron sheeting, installing two 5,000 kw. turbo-alternators $[illegible]500, 2 water tube boilers, $88,500, and water cooling tower 350,000 gal. capacity per hr.

Germany, Hamburg—F. A. Sohst, Grusdeich 20, in market for considerable quantity of birch, plywood, suitable for aeroplane construction. Quotations should cover boards in thickness of 0.9, 1, 1.2, 2.25 and 3 millimeters in standard lengths and widths. Cable Hozsohst, Hamburg, Code: Universal Lumber Code.

Italy—Rossi Electrochemical Co., Milan, plans hydrogenation works (chemical plant). To exceed $28,500. Government has granted permission for plant construction.

Italy, Cosano Maderne—A.C.N.A. Co., Milan, Italy, plans chemical plant. $500,000.

Italy, Porto Recanati—Sociaeta Cipra, Porto Recanati, plans soap and toilet preparations plant. Italian Government has licensed project.

New Zealand, Wellington—Aug. 15, by Deputy Ministry Dpt. Posts & Telegraphs, 1,000 fifty volt telephone switchboard lamps, 50,000 dry cells (1.5 volt) for telephones and for galvanized coach screws***Aug. 20, for supply 750 microtelephone handles***Aug. 21, by Secretary Dpt. P. Wks., supply sixteen 300 watt outdoor station lighting fixtures.

Scotland—Aberdeen City Architect preparing plans school, School Rd. $921,250; also 500 houses $722,500***Ardrasson** Town Council voted $121,380 for 84 houses.

Spain, Barcelona—R. Masso Y Cia Caspe 130, in market for supplying bichromite of sodium and bichromite of potash.

Tasmania, Hobert—Nov. 5, by Dpt. P. Wks., supplying water turbine generating equipment and transformers for Derwent Valley Power Scheme.

Union Socialist Soviet Republics—Bureau of Educ., Soviet Government, Moscow, or c/o Amtorg Trading Co., 261 5th Ave., New York, plans constructing 2,500 country schools.

Union Soviet Socialist Republics—Ministry of Light Industry, Soviet Government, or c/o Amtorg Trading Corp., 261 5th Ave., New York, shoe factory, at Sverdlovsk, day labor. To exceed $1,000,000.

Union Socialist Soviet Republics—Railroad Trust, c/o Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, completing and extending 1,195 kilometers Moscow-Don Basin R.R. from Moscow to Don Basin, by day labor.

Union Socialist Soviet Republics—Transcaucasian Cotton Textile Combine, Soviet Government, Moscow, or c/o Amtorg Trading Corp., 261 5th Ave., New York, plans 200,000 spindle cotton mills. To exceed $500,000.

Wales—British Iron & Steel Co. Ltd., Cardiff, plans rod and wire plant, $750,000***Catchment Bd., Wye,** preparing plans removing river obstructions, $150,000.

PUBLIC BUILDINGS

PROPOSED WORK

Calif., Los Angeles—Bd. Educ. plans by W. Webber, 627 South Carondelet St., rehabilitating, strengthening and reconstructing building at Lincoln High School, incl. main building, English Hall, power plant, library building and music hall, 3625 North Broadway. $226,800.

†Conn., Plainville—Treas. Dpt. at office Sup. Archt., Wash., D. C., making plans 1 story, basement, brick, stone post office, Whiting St. To exceed $50,000. Noted Nov. 27.

Ind., Decatur—Decatur Homesteads, Inc., A. A. Watrous, dir., plans completed by McNalley & Quinn, 10 South LaSalle St., Chicago, Ill., and soon takes bids housing project. **P.W.A.**

Mass., Attleboro—City, E. F. Thayer, chm. School Com., plans by Kilham, Hopkins & Greeley, 126 Newbury St., Boston, Senior High School addition, County St. To exceed $150,000. Stone-Underhill Co., 78 Woodbine St., Quincy, engrs.

†Mass., Nantucket—Treas. Dpt. at office Sup. Archt., Wash., D. C., 1 story, basement, brick, stone post office, concrete found. To exceed $50,000. Private plans. Noted Nov. 3, 1932.

†Federal Government.

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Public Buildings (Continued)

Mass., Quincy—City, Public Buildings Dpt., City Hall, voted down plans for 3 story, basement addition to Junior High School, Hancock and East Squantum Sts. $300,000. F. I. Cooper Corp., 47 Winter St., Boston, archts.

Mass., Waltham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, rescinded contract for 4 wing addition to medical and surgical building, at Metropolitan State Hospital. Will readvertise. G. Robb, 87 Beacon St., Boston, archt. Albert B. Franklin, Inc., 38 Chauncy St., Boston, engrs. Noted May 24.

†**Mass., West Springfield** — Treas. Dpt. at office Sup. Archt., Wash., D. C., plans 1 or 2 story, basement, concrete, brick, stone, post office. $85,000 funds appropriated.

Minn., Worthington—City, W. H. Buchan, clk., making plans furnishing, installing turbine generator in power plant. $30,000. C. Foster, 512 Sellwood Bldg., Duluth, engr.

Mo., Kansas City—Bd. Educ., County Bldg., preparing working drawings and takes bids in about 4 months 3 story, basement, brick, steel high school, 22nd and Minnesota Sts. $1,600,000. P.W.A. project. Hamilton, Fellows & Nedved, 814 Tower Court, Chicago, Ill., archts. W. Radotinsky, Huron Bldg., Kansas City, assoc. archt.

†**N. H., Meredith**—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans 1 story, basement, concrete, brick, stone post office. $70,000 funds appropriated.

N. J., Cranford—Treas. Dpt. at office Sup. Archt., Wash., D. C., plans post office, $105,000. Bids for 95x150 ft. site July 28.

N. J., New Brunswick—Bd. Freeholders Middlesex Co., bids about September, hospital, $575,000. J. N. Pierson & Sons, Inc., 313 State St., Perth Amboy, archts. Noted Dec. 14, 1933.

N. J., Rumson—City bids about September, school, $196,000. P.W.A. project. J. N. Pierson & Son, Inc., 313 State St., Perth Amboy, archts.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, Flatbush Ave. extension and Concord St., 5 story, brick, school addition, 12th Ave. from 81st to 82nd Sts. $165,000.

N. J., Secaucus—Bd. Freeholders Hudson Co., Court House, Jersey City, plans by J. T. Rowland, 30 Journal Sq., Jersey City, and takes bids about Aug. 25, hospital, $2,996,000. P.W.A. project. Noted Oct. 5, 1933.

N. Y., Ellenville—Bd. Educ. bids early in fall brick, steel school, plain found. $105,000. R. R. Graham, 25 Prospect St., Middletown, archt. E. E. Seelye, 101 Park Ave., New York, engr. P.W.A. project. Noted Apr. 5.

N. Y., Hammondsport—School Bd. bids early in fall, Glen Curtiss Memorial Grade and High School, 2 story, basement, brick, steel, plain found. $250,000. R. R. Graham, 215 Prospect St., Middletown, archt. E. E. Seelye, 101 Park Ave., New York, engr. P.W.A. project. Noted May 17.

N. Y., Lawrence—Bd. Educ., Hempstead, soon takes bids high school. $825,000. P.W.A. funds allotted. L. J. Lincoln, Franklin Ave., Hewlett, archt. Noted Apr. 5.

N. Y., Hoppers Glen—Bd. Managers Onondaga Co. Sanitarium, Syracuse, plans completed by Randall & Vedder, S. A. and K Bldg., Syracuse, steel nurses home, plain found. $215,000.

N. Y., Pottersville—Bd. Educ., Chester, soon takes bids school. $130,000. P.W.A. funds allotted. C. W. Clark, Corland, archt. Noted Apr. 5.

N. Y., South Otselic—Central School Dist. 1 bids in August, 2 story, basement, brick, steel grade and high school, plain found. $125,000. Hallenbeck & Sargent, 912 Harrison St., Syracuse, archts. Noted Apr. 5.

N. Y., Tupper Lake—Village plans by R. R. Graham, 25 Prospect St., Middletown, 2 story, basement, brick, steel grade and high school, plain found. $300,000. Noted Jan. 4, 1934.

N. C., Aberdeen—Moore Co. Bd. Educ., J. W. Graham, chn. Bd., plans election Aug. 25, for schools. $331,000. P.W.A. loan requested but so much opposition that election will be held Aug. 25 for vote of people.

Ohio—Buckeye Co-Operative Homesteads Assn., J. S. Green, 1136 Standard Bank Bldg., constructing 500 homes, central power plant, 2 factories, sewers, roads, waterlines, at Subsistence Farms, in Geauga and Portage Counties. $3,000,000. Applied for Government loan. Private plans.

O., Cleveland—City, W. J. Rogers, dir. P. Utilities, plans repairing and expanding municipal light plant, and new equipment at foot of East 53rd St. $250,000. L. A. Quayle, 105 City Hall, engr.

†*Federal Government.*

R. I., Lincoln—Town, J. L. Smith, supt. Schools, Lonsdale, plans nearing completion by A. H. Humes, Record Bldg., Pawtucket, for Senior High School, 2 story, basement, 70x240 ft., brick, concrete, cast stone, concrete found. $200,000. P.W.A. grant and loan approved. Noted Dec. 21.

R. I., Tiverton—Town, L. M. Wagner, supt. schools, voted down plans for high school addition. To exceed $150,000. E. I. Marvel, 209 Bedford St., Fall River, Mass., archt. Noted May 31.

S. C., Irmo—City plans by H. S. Singley, Prosperity, 1 story, frame grammar school, 2 story, brick high school. $120,000. P.W.A. loan approved.

Tenn., Memphis—City plans completed by W. F. Schulz, Shrine Bldg., John Gaston Memorial Hospital, 6 story, brick, limestone, rein.-con. Madison Ave. east of Dunlap St. N. $750,000. P.W.A. approved $300,000 loan on June 23. $400,000 Gaston trust fund, and $160,000 bond issue voted.

Tex., Austin — Bd. Regents, University of Texas, c/o J. W. Calhoun, comptroller, plans by R. L. White, superv. archt., Austin, and P. Cret, consult. archt., Architects Bldg., Phila., Pa., 2 dormitories. Est. $500,000. P.W.A. approved $408,000 allotment.

Low Bidders

The McGraw-Hill Construction Daily reports low bidders. Business News Department, Engineering News-Record, 330 W. 42nd St., New York, N. Y.

Tex., Denton—College of Industrial Arts, c/o W. M. Loveless, bus. mgr., plans science and fine arts buildings. P.W.A. approved $265,000 allotment.

Tex., Denton—North Texas State Teachers College, c/o R. L. Marquis, pres., plans students' union and dining hall. P.W.A. approved $210,000 allotment. W. C. Hedrick, Inc., 1st Natl. Bank Bldg., Forth Worth, archts.

Tex., Gladewater—Bd. Educ., T. J. Sturdevant, pres., plans by E. G. Withers Architectural Co., Holmes Bldg., Fort Worth, school buildings, incl. elementary school for white, elementary school for negroes and general remodeling present elementary schools. $200,000.

Tex., Henderson—Ind. School Dist., c/o C. O. Pollard, supt., plans by J. A. Cararas, 1st Natl. Bank Bldg., remodeling school. $154,600. Allotment approved by P.W.A. Noted Mar. 1.

Tex., Huntsville—Sam Houston State Teachers College, c/o H. F. Estell, pres., Huntsville, plans by W. E. Ketchum, 2092 East Milton St., Austin, girls dormitory. $150,000 P.W.A. allotment approved.

Tex., Kingsville—Texas College of Arts & Industries, c/o E. W. Seale, Kingsville, plans by J. M. Marriott, Frost Natl. Bank Bldg., San Antonio, 2 dormitories. $300,000 P.W.A. allotment approved.

Tex., Tyler—City, c/o L. H. Powell, mgr., plans by S. Simons, Citizens Bank Bldg., hospital. P.W.A. approved $187,000 allotment. Noted Oct. 26.

Wash., Seattle—Bd. Educ. plans high school on Arlington High School site. $100,000 or more. **Maturity indefinite.** Architect not appointed.

Wis., Columbus—Bd. Educ., plans by Oppenhamer & Old, Green Bay, 2 story, basement, 72x156 ft., brick, rein.-con. school, plain found. $150,000. Noted July 12.

Man., Winnipeg—Dpt. P. Wks. soon takes bids 3 story, 110x130 ft. addition to Deer Lodge Hospital. $150,000.

Ont., Galt—Dpt. P. Wks., Ottawa, making plans and soon takes bids 3 story, brick, stone, steel building. $161,000.

Sask., Regina—Dpt. Public Wks., Ottawa, Ont., soon takes bids constructing building. $400,000.

BIDS ASKED

†**Ariz., Winslow**—Aug. 10, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Calif., Norwalk—Aug. 7, by Bd. Public Buildings Reconstruction, 100x100 ft., rein.-con. classroom building. $107,000. T. C. Kistner, 814 Architects Bldg., Los Angeles, archt. Noted Nov. 2.

Calif., Sacramento—See "Contracts Awarded."

†**Calif., San Francisco**—Aug. 14, by Con. Q.M., single attendants quarters and mess hall at U. S. Quarantine Station.

Calif., San Mateo—Aug. 2, by Trustees San Mateo High School Dist., brick, steel, concrete additions to San Mateo High School and Applied Arts Building, and additions to Burlingame High School. $120,000. H. Hammill, 381 Bush St., San Francisco, engrs. Noted July 19.

Conn., Collinsville—Aug. 8, by High School Building Comm., Town Hall, Collinsville, 3 story, basement, 60x150 ft., brick school, Simmons and Dyer Sts., for Town of Canton, Bd. Selectmen, Town Hall, Canton. $105,000. P.W.A. project. Towner & Sellew, 329 Main St., Middletown, archts. Noted June 7.

†**Ill., Chicago**—July 31, by Treas. Dpt. at office Sup. Archt., Wash., D. C., installation of the extension present automatic telephone system at U. S. Post Office.

Ill., Chicago—Aug. 7, by Sanitary Dist. of Chicago, constructing hydro-electric units with appurtenances, incl. 8,500 hp. hydraulic turbines, 220 hp. hydraulic turbines, 7,500 kva. generators, 150 kw. generators, for Lockport Power House, about 1 mi. south of 16th St., Lockport, on Sanitary Dist. Main Channel. Will Co.

†**Ill., Oak Park**—Aug. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office, adv. E.N.-R. July 26.

Ind., Melott—School Trustee W. Carmen, trustee, Fountain Co., taking bids new heating plant and boilers.

Md., Hagerstown—Aug. 7, by Buckler & Fenhagen, archts., 325 North Charles St., Baltimore, 4 story, basement, brick, rein.-con. hospital, plain found., for Washington County Hospital. $400,000. H. F. Doeleman, 516 North Charles St., Baltimore, engrs. Noted June 14.

Mass., Framingham—Aug. 3, by Commonwealth of Massachusetts, Dpt. Educ., Boston, enlarging kitchen and other building changes, heating, plumbing and electrical work at State Teachers College.

†**Mass., Franklin**—Aug. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Mass., South Hadley—Aug. 7, by Mt. Holyoke College, M. E. Wooley, pres., 3 story, basement, tower, irregular sized, brownstone library addition, concrete found. at college. To exceed $150,000. Allen, Collens & Willis, 75 Newbury St., Boston, archts. Noted June 14.

Mass., Waverly—July 31, by Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 3 story, basement, irregular sized brick infirmary, concrete found., at State School. $300,000 P.W.A. loan and grant. C. P. Hoyt, 344 Boylston St., Boston, archt.

†**Mich., Gladstone**—Aug. 9, by Treas. Dpt. at office Sup. Archt., Wash., D. C., constructing U. S. Post Office.

Minn., Hibbing—Aug. 1 (extended date), by Village, A. M. Long, recdr., 2 story, basement, 302x322 ft., rein.-con., stone, memorial building. $436,000. Erickson & Co., 709 Alworth Bldg., Duluth, Minn., archts. Burlingame & Hitchcock, 526 Sexton Bldg., Minneapolis, engrs.

N. J., Marlboro—Aug. 7, by Dpt. Institutions & Agencies, State Office Bldg., Trenton, building. $387,200. P.W.A. project. C. A. Leathem, Jr., State House, Trenton, archt.

N. Y., Beacon—Aug. 9, by Commissioner Correction, State Office Bldg., Albany, construction work for miscellaneous additional work staff house, auditorium, chapel, male ward building, and farm colony, at Matteawan State Hospital.

N. Y., Corning—Aug. 17, by Adjutant General, Capitol, Albany, construction, heating, sanitary, electrical work for state armory and service connections.

†**N. Y., Ellis Island**—Aug. 3, by Treas. Dpt. at office Sup. Archt., Wash., D. C., remodeling immigration station.

N. Y., New York—July 31, by W. F. Morgan, Jr., comr. Public Markets, Weights & Measures, Municipal Bldg., installing plumbing, drainage, gas, repaving work for 48 merchant stores, restaurant, comfort station, at Bronx Municipal Terminal Market, at Exterior and East 150th Sts., Bronx Boro.

N. Y., Niagara Falls—Aug. 14, by Adjutant General, Capitol, Albany, new heating boiler, heating repairs, for State Armory.

N. Y., Orangeburg—July 25, by Commissioner Dpt. Mental Hygiene, State Office Bldg., completing heating work children's group, staff

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Public Buildings (Continued)

and employee accommodations, shop building, assembly hall and service connections, Rockland State Hospital, Rockland Co.

N. Y., Pine Aire Station—Aug. 15, by Dpt. Mental Hygiene, State Office Bldg., Albany, miscellaneous additional work Buildings 21, 22, 23 and 24, Pilgrim State Hospital.

N. Y., Poughkeepsie—Aug. 1, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, miscellaneous additional construction work at Buildings 3, 4, 10, 12, 13 and 14, Hudson River State Hospital.

N. Y., Sonyea—Aug. 1, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, hand power elevator at Loomis Infirmary, Craig Colony.

N. Y., Wassaic—Aug. 8, by Commissioner Dpt. Mental Hygiene, State Office Bldg., Albany, construction work for Buildings 53, 54, 55 and 56 at Wassaic State School.

N. Y., Westbury—July 30, by Bd. Educ., school. $350,000. W. H. Spaulding, 185 Jamaica Ave., Jamaica, archt.

N. Y., Whitehall—July 31, by Adjutant General, Capitol, Albany, new heating system for state armory.

†O., Youngstown—Aug. 14, by Treas. Dpt. at office Sup. Archt., Wash., D. C., air cooling at U. S. Post Office and Court House.

†Tex., San Antonio—Treas. Dpt. at office Sup. Archt., Wash., D. C., bids about Aug. 15, post office, $1,525,000. R. H. Cameron, Majestic Bldg., archt. Noted Jan. 18.

†Va., Fort Humphreys—July 30, by Con. Q.M., constructing enlisted specialist school, $50,000.

Wis., Kaukauna—Aug. 2, by Bd. Educ., general contract 1 story, part basement, 106x186 ft. high school addition for auditorium and gymnasium. Smith & Brand, Appleton, archts.

Wis., Madison—July 30, by Dane Co., S. I. Fjelsbad, clk., Court House, 2 story, 78x102 ft., brick, steel dormitory, plain found. at sanitorium. Starck & Schneider, 8 South Carroll St., archts. Noted May 31.

†Wis., Milwaukee—Aug. 8, by Treas. Dpt. at office Sup. Archt., Wash., D. C., reconditioning roof at U. S. Post Office.

CONTRACTS AWARDED

†Ala., Auburn—Dpt. Agriculture, Div. Purchases, Sales, Traffic, Wash., D. C., farm tillage machinery laboratory, to J. M. Raymond Constr. Co., Jacksonville, $29,222. Bids May 4. Noted Apr. 19.

Ark., Benton—State Constr. Comn., State Capitol, Little Rock, general contract laundry building, dairy house, cow barn, calf barn, dry cattle barn, 8 patients' dormitories, 2 cafeterias at State Hospital, to N. Wohlfeld Constr. Bldg., Dallas, Tex., $833,867***electrical work, to Broon Electric Co., Amarillo, Tex., $30,880*** kitchen and cafeteria equipment, to Goodner-Van Devanter Co., Oklahoma City, Okla., $26,202***laundry equipment to Troy Mfg. Co., Troy, N. Y., $28,672***heating, ventilating, to Brooks Turner, Warren, $114,980***plumbing, to T. L. Dawson, 2035 Washington St., Kansas City, Mo., $63,000***miscellaneous utilities, installing sanitary and storm sewers, water distribution system, gas distribution system, addition to present filter plant, underground steam and hot water systems, heating boilers, boiler house, piping and equipment, to Carson Bros., Des Moines, Ia., $378,430. Grand total $1,476,031. **P.W.A.** Bids July 6, awarded July 6. State Constr. Comn., Little Rock, miscellaneous equipment, furniture, shades, utensils, etc., from Marshall Field & Co., 144 Lake Oak Park, Chicago, Ill., $71,975. Noted June 14.

Ark., Russellville—Trustees Arkansas Polytechnic College, general contract dormitory, residence, garage, faculty apartment building and home economics building, to Leveck & Son, 2600 Battery St., Little Rock, $89,300***electrical contract, to North Little Rock Electric Co., 315 Main St., North Little Rock, $4,838***steel bleachers, to Pittsburgh-Des Steel Co., Dallas, $6,588***mechanical utilities, to Russellville Plumbing & Heating Co., Russellville, $7,977***underground cables, to Mack Electric Co., 4581 Gravois St., St. Louis, Mo., $1,115. Grand total $109,818. **P.W.A.** Bids July 10, awarded July 10. Rejected bids plumbing, heating work for above, will readvertise. Noted May 10.

†Ariz., Yuma—Treas. Dpt. at office Sup. Archt., Wash., D. C., air conditioning plant for Yuma Federal building, to York Ice Mchy. Corp., 5051 Santa Fe Ave., Los Angeles, Calif., $22,990. Est. $20,000. Bids June 29. Noted June 14.

Calif., Sacramento—State, Dpt. Architecture, P. Wks. Bldg., 1 story, 80x400 ft., wood frame educational building and 2 wood frame horse barns, State Fair Grounds, own forces.

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Calif., Visalia—Clerk, Tulare Co., 4 story, rein.-con. courthouse addition, to F. J. Reilly, 6350 Fulton St., San Francisco, $125,721. **P.W.A.** Bids July 12, awarded July 17. Noted July 5.

Ind., Fort Wayne—City, underground duct work and electric wiring city light plant, to Kelly Electric Co., 226 East Berry St., $13,849. Bids June 7. Noted May 31.

Ind., Union Mills—School Trustees, heating and ventilating system for school, to Slutsky Plumbing & Heating Co., South Bend, $16,700. Est. $18,000. Noted June 28.

Ia., Bellevue—Bellevue Bd. Educ., school heating system, to Harvey Weinschenk & A. Dieckman, Bellevue, $3,936. **P.W.A.**

Ia., Iowa City—University of Iowa, general contract brick, concrete dormitory unit, to A. E. Newmann & Bros., Des Moines, $128,009***psychopathic hospital, to Stark Building Co., Cedar Rapids, $16,090***and to C. Holmquist, Moline, Ill., $7,549***fine arts building, to O. F. Paulsen, Cedar Rapids, $147,132. Grand total $298,780. **P.W.A.**

†Ky., Mayfield—Treas. Dpt. at office Sup. Archt., Wash., D. C., extending and remodeling U. S. Post Office, to Lundberg-Richter Co., Inc., Oceanport, N. J., $48,917. Est. $55,000. Bids July 17. Noted July 5.

†La., New Orleans—Treas. Dpt. at office Sup. Archt., Wash., D. C., air conditioning system for U. S. Marine Hospital, to American Heating & Plumbing Co., 829 Barrone St., $3,997. Bids Mar. 28.

Mass., North Grafton — Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, furnishing boilers for boiler plant addition at State Hospital, to E. Keeler Co., 99 State St., Boston, $22,251*** constructing boiler settings, to Rust Eng. Co., 2600 Koppers Bldg., Pittsburgh, Pa., $9,850*** furnishing stokers, to Flynn & Emrich Co., 142 Berkeley St., Boston, $5,734. Grand total $37,835. **P.W.A.** Bids June 11. Noted June 7.

Minn., Winona—Bd. Educ., general contract 2 story, basement, 157x246 ft., rein.-con., brick, stone school, to Standard Constr. Co., 1101 Plymouth Bldg., Minneapolis, $225,740; electric wiring, to Winona Electric Constr. Co., 178 Main St., $13,444. **P.W.A.** Bids July 11. Noted June 21.

Mo., Greenville—L. V. Meador, general contractor, Fredericktown, brick, lime, cement, lumber, lath, hollow tile, for school, for Consolidated School Dist. 9, E. Barrow, pres. Wayne Co. to March Lumber & Mercantile Co., Greenville***sheet metal skylight and ventilation, to Hammond Sheet Metal Co., 119 Cass Ave., St. Louis***vault door, to Howe Scale Co., 3001 North Bway., St. Louis***iron work, to Banner Iron Wks., 4560 Shaw Ave., St. Louis***reinforcing steel, to Koerner Eng. Co., Syndicate Trust Bldg., St. Louis***plumbing and heating, to A. C. McCulland, Fredericktown***millwork, to Huttig Sash & Door Co., 1200 South Vandeventer Ave., St. Louis***electrical work, to Hesse-Schaeffer Electric Co., Inc., 921 Baden St., St. Louis***fire door, to J. A. McFail Co., 4903 Tieman St., St. Louis***hardware, to Simmons Hardware Co., 900 Spruce St., St. Louis***metal partitions, to G. A. Caine, 825 Chemical Bldg., St. Louis. **P.W.A.** Noted Mar. under "Contracts Awarded."

Mont., Bozeman—State Bd. Educ., Helena, general contract student resident hall at Montana Sate College, to Mead & Mount, Denver Natl. Bank Bldg., Denver, Colo., $176,900. **P.W.A.** Bids July 2.

Mont., Butte—State Bd. Educ., Helena, general contract 3 story, basement, dormitory, at State School Mines, to Lovering-Longhotham Co., 605 Builders Exchange Bldg., and P. Steenberg Constr. Co., 1757 1st Natl. Bank Bldg., both St. Paul, Minn., $219,879. **P.W.A.** Bids July 2.

Mont., Missoula—Bd. Educ., general contract part 2 story, 57x115 ft. union building and 70x169 ft. auditorium, at State University, to J. E. Hightower, Missoula, $192,662; electric wiring, to Western Montana Electric Co., Missoula, $5,450. **P.W.A.** Bids July 2.

N. H., Dover—Osgood Constr. Co., general contractors, Nashua, heating for 2 story, basement, 72x158 ft. and 53x70 ft., brick, limestone municipal building, concrete found., to V. J. Kennealy Co., 251 Causeway St., Boston, Mass., for City, F. C. Keefe, mayor and chn. Building Comn. **P.W.A.** Noted June 28, under "Contracts Awarded."

N. Y., Ausable Forks—Bd. Educ., plumbing for school, to Hamline Co., 529 Oriskany St., Utica, $11,490. Noted July 5, under "Contracts Awarded."

N. Y., Jamestown—Bd. Educ., general contract industrial arts building, to Haas Constr. Co., 1001 Monroe St., Jamestown, $116,775***electrical work, to Linquest Electric Co., 309 Main St., Jamestown, $16,191***heating and ventilating, to Quackenbush & Co., Buffalo, $19,883***plumbing, to McGinity, Johnson, 214 Pendergast Ave., $7,192. Grand total $160,041.

O., Cleveland—City, W. J. Rogers, dir. Public Utilities, boiler settings for municipal light plant, to McCabe Constr. Co., 1758 Central Ave., Cincinnati, $49,988. Bids June 29, awarded July 11. F. H. Cover, 502 City Hall, eng.

Okla., Shawnee—Comrs. Pottawatomie Co., 3 story, rein.-con., brick court house and jail, to W. R. Grimshaw Co., Tulsa, est. $175,000. **P.W.A.** Bids July 10.

Tenn., Nashville—George Peabody College for Teachers, Nashville and P.W.A., 4 story dormitory, 48x64x122 ft., brick, rein.-con. dormitory, plain found., to V. L. Nicholson Co., Independent Life Bldg., $130,000. G. Jackson, Jr., 120 Vendome Bldg., archt. Awarded July 13.

†Tenn., Nashville—Treas. Dpt. at office Sup. Archt., Wash., D. C., installing interior lighting fixtures, to Tri State Electric Co., 324 North Willet St., Memphis, $4,100. Bids June 13.

Tex., Galveston—Bd. Trustees Galveston Public Schools, general contract 2 story, brick, rein.-con. elementary school, 52nd and Nebraska, to J. W. Zempter Co., 2115 Avenue F, $134,985***heating and ventilating, to A. J. Warren, 2313 Avenue E, $29,460***electrical wiring, to J. B. Copeland Electric Co., M and M Bldg., Houston, $7,750. Grand total $192,195. **P.W.A.**

†Wash., Port Angeles—U. S. Coast Guard hangars at Ediz Hook, to Pioneer Constr. Co., Textile Tower, Seattle, $96,900.

Wis., Chilton—Bd. Educ., general contract 2 story, basement, 310x351 ft., brick high and grade school, plain found., to B. B. Gansler Co., 78 State St., Oshkosh, $136,840. Heating and ventilating, to J. E. Robertson, Wauwatosa, $20,472. Bids July 12. Noted July 6 Daily.

COMMERCIAL BUILDINGS

PROPOSED WORK

Colo., Colorado Springs—Interstate Theatres Inc., and J. H. Cooper Enterprises, Inc., Oklahoma City, J. E. Tompkins, c/o Rialto Theatre, Colorado Springs, local mgr., plans by R. Boller of Boller Bros., Kansas City, Mo., and Los Angeles, Calif., new theatre on East Pike's Peak Ave.

Conn., New Britain—Holy Cross Parish, S. Bartkowski, pastor, 200 Farmington Ave., plans by A. De Pace, 151 West 46th St., New York, superstructure 1 story, basement, 60x200 ft. church, Farmington Ave., $100,000 voted by Committee to continue construction of church proper to basement church now in progress.

Ill., Waukegan—Alexian Bros. Hospital, c/o Brother Gerard, provincial superior, 1200 Bladen Ave., Chicago, plans by Maher & McGrew, 1564 Sherman Ave., Evanston, and takes bids about Sept. 1, 3 and 4 story noviate building, power house and generating plant, Holdridge Rd. and Lewis Ave. $600,000.

N. Y., Brooklyn—G. Bernstein, 169 Duane St., New York, plans by P. Markowitz, 5 Beekman St., New York, altering plumbing, heating in two 4 story buildings, Lafayette and Grand Aves. $28,000.

N. Y., Brooklyn—M. Boxer, 891 East 14th St., plans by S. Gold, 589 Flatbush Ave., altering chimney, heating in 3 story, studios, stores and apartments, Brevoort Pl. and Franklin Ave. $28,000.

N. Y., Brooklyn—Brooklyn Ridgewood Corp., 6th Ave. and 50th St., New York, plans by T. W. Lamb, 701 7th Ave., New York, 2 story, 92x194 ft. theatre, 50th St. and 5th Ave. $250,000.

N. Y., Brooklyn—H. Lefrak, 16 Court St., plans by Kavy & Kavovitt, 16 Court St., 6 story, 90x100 ft. apartment, 4th Ave. and 81st St. $150,000.

N. Y., Brooklyn—S. Lipoff, 1935 66th St., plans by Kavy & Kavovitt, 16 Court St., 6 story, 100x131 ft., brick apartment, Fort Hamilton Parkway and 85th St. $125,000.

N. Y., Brooklyn—Nostrand Flatbush Corp., c/o T. W. Lamb, archt., 701 7th Ave., New York, plans 2 story, 120x184 ft. theatre and stores, Nostrand Ave. and Avenue H. $250,000.

N. Y., Brooklyn—Kings Highway Theatre Corp., c/o T. W. Lamb, archt., 701 7th Ave., New York, plans theatre, Ocean Ave and Kings Highway. $250,000.

N. Y., New York—Drive Development Corp., 301 East 8th St., plans by Seeling & Finkelstein, 153 Pierrepont St., 6 story, 90x150 ft. brick apartments, 50 East 19th St. $200,000.

†*Federal Government*

Commercial Buildings (Continued)

N. Y., New York—Federal Reserve Bank of New York, William and Liberty Sts., plans by York & Sawyer, 100 East 42nd St., bank and office addition, William and Liberty Sts. $800,000.

N. Y., New York—Loster Realty Co., Bway. and 139th St., L. E. Schlechner, pres., plans plumbing, heating, altering store and office, Bway. and 139th St. $30,000 or more.

N. Y., New York—Y. M. C. A. Retirement Fund, 347 Madison Ave., will award contract about Aug. 1 from bids submitted by selected contractors heating, plumbing, modernizing 5 story, Y. M. C. A. building, Beck St. and Drinkwater Ave. $28,000. Sampson & Levy, 341 East 149th St., archts. Noted July 5.

N. Y., Patchogue—Canaan Lake Park, Inc., c/o Futterman & Harris, 1472 Bway., New York, plans summer colony development, incl. 75 homes. To exceed $100,000. Architect not appointed.

O., Cleveland—A. M. Gordon & Associates, Chester-Ninth Bldg., plans brick, steel, concrete theatre and commercial building. $105,000. Architect not appointed.

O., Toledo—D. J. O'Brien, Toledo, and 6745 Ridge Blvd., Brooklyn, N. Y., purchased Commodore Perry Hotel and plans enlarging same. $750,000. Mills, Rhines, Bellman & Nordhoff, Ohio Bank Bldg., archts.

Pa., Reading—Reading Fair Assn., 522 Court St., plans convention hall on fair grounds. $250,000. Architect and engineer not appointed.

Utah, Mount Pleasant—Presbyterian Bd. Natl. Missions, 156 5th Ave., New York, N. Y., sketches by A. G. Lamont, c/o owner, building 2 story, 32x111 ft. industrial arts building and main educational building at Wasatch Academy, destroyed by fire. $115,000.

Wis., Green Bay—Catholic Central High School, F. X. Exer, 209 South Adams St., plans brick, rein.-con., steel high school, plain found. $150,000. Architect not appointed.

BIDS ASKED

Ky., Louisville—July 30, by Montgomery Ward & Co., 619 West Chicago Ave., remodeling 5 story, mezzanine, basement, 62x157 ft. department store, 450-454 Fourth St. $50,000. N. P. Rice, c/o owners, archts.

Mo., St. Louis—St. Gabriel the Archangel, Roman Catholic Parish, c/o F. H. Skaer, pastor, 5605 Lisette Ave., bids about Aug. 15, 2 story, basement, 59x109 ft., rein.-con. brick, concrete church and parochial school Tamm and Murdock Sts. $75,000-$105,000. A. F. and A. Stauder, 6032 South Kingsway, archts. Noted June 21.

Mont., Glasgow—Aug. 2, by Frances Mahon Deaconess Hospital, R. M. Young, chn. Bd. Directors, Glasgow, altering and constructing 3 story, basement, 41x156 ft., rein.-con., brick, tile, hospital addition, $125,000. Bird & Van Teylingen, Medical Arts Bldg., Great Falls, archts.

N. Y., Brooklyn—D. Nussdorf, 666 Willoughby Ave., taking bids general and separate contracts altering heating, plumbing in 4 story public assembly, $35,000. H. I. Feldman, 15 West 44th St., New York, archt. Noted Mar. 15.

CONTRACTS AWARDED

Ill., Chicago—Archdiocese of Chicago, c/o Cardinal Mundelain, archbishop of Chicago, 719 North Wabash Ave., general contract brick, stone, steel superstructure for Our Lady of Grace Church, 2446 North Ridgeway Ave., to Henry Bros., 7300 Calumet Ave., Chicago, $147,500. J. W. McCarthy, 43 East Ohio St., archt. Lewis & Gonzales, 4530 Justine Ave., structural engrs. H. L. Clute, 307 North Michigan Ave., mechanical engr. Bids July 3, awarded July 10.

Mich., Marquette—St. Luke's Hospital, 3 story, basement, 75x90 ft. nurses home, to F. E. Waster, West Washington St.; heating and plumbing, to Lavine Bros., Marquette. Est. about $105,000. Noted May 17.

N. J., Newark—Prudential Life Insurance Co. of America, 153 Halsey St., group of six 5 and 6 story apartment houses, Spruce, Somerset, Barclay and Waverly Aves., to E. M. Waldron, 40 Park Pl. Est. exceeds $1,000,000. Noted July 19.

O., Cleveland—Walker & Weeks, 2341 Carnegie Ave., archts., interior work, marble, plastering, counters, cases, heating, plumbing, electric, lighting, fixtures, decorating in department store, 630 Euclid St., to Sam W. Emerson Co., 1836 Euclid Ave., for Wm. Taylor Son & Co., C. H. Strong, genl. mgr. Noted June 29 Daily.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ariz., Phoenix—MEAT PACKING PLANT—Tovrea Packing Co., plans meat packing plant addition, $35,000 with equipment.

Calif., Santa Rosa—MEAT PACKING PLANT—Sagta Rosa Meat Packing Co., J. B. Humphrey, pres., plans reconstructing present building and installing equipment for meat packing plant, College Ave. $40,000 or more, incl. equipment.

Calif., Stockton — WAREHOUSE — Schuler-O'Connell Grain Co., plans rebuilding or reconstructing delta warehouse, destroyed by fire. Fire loss $150,000, with contents.

Colo., Denver—PACKING PLANT—K and B Packing & Provision Co., 4800 Washington St., plans packing plant, 4800 Washington St. To exceed $100,000. Architect not appointed.

Ill., Paris — GRAIN ELEVATOR — General Grain Corp., Indianapolis, Ind., plans grain elevator. $40,000 or more. Architect not appointed.

Ill., Peoria—PLANT—Premier Pabst Co., Peoria, plans plant addition. To exceed $150,000. **Maturity indefinite.** Architect not appointed.

Minn., Minneapolis — PLANT — Hiawatha Brewing Co., H. Knudson, pres., plans plant additions and equipment. To exceed $30,000. Financing in progress.

Miss., Meridian—STORAGE, etc.—Sears Roebuck & Co., Loop S and Van Buren Sts., Chicago, Ill., plans altering and installing equipment 4 story, brick storage, distribution and store building. Est. $35,000 or more.

Nev., Reno—CYANIDE MILL—Buckskin Natl. Gold Mining Co., Reno, W. J. Bell, pres., Winnemucca, plans constructing 50 ton cyanide mill and other structural improvements. $150,000.

N. J., Jersey City—CHEMICAL PLANT—Hagman Bros., Coles St., plans charcoal plant, 33 Division St. To exceed $30,000. Architect not appointed.

N. Y., Brooklyn—SERVICE GARAGE—Karron & Keiberman, 812 New Jersey Ave., plans by C. Goodman, 375 Fulton St., 1 story, 100x122 ft., brick, McDonald and South 20th Aves. $40,000.

N. Y., New York—GARAGE and STORAGE—Breen Contg. Co., 4720 Bway., plans garage, storage, contractors yard, East 156th St. and Truxton St. $28,000 or more. Architect not appointed.

N. Y., New York—GARAGE—J. J. Dunnigan, archt., 2382 Grand Concourse, deferred taking bids garage, Grand Concourse and 182nd St., for J. Rice, Milford, Conn. Project indefinitely in abeyance. $30,000 or more.

N. C., Greensboro—KNITTING MILL—Corporation being formed, c/o J. C. Smith, Greensboro Chamber of Commerce, plans knitting mill. To exceed $100,000. Architect not appointed.

O., Minerva—PLANT—Cronin China Co., D. Cronin, pres., New Cumberland, W. Va., will purchase 2 idle plants of former, Owen China Co., here, rehabilitate same and construct new tunnel kiln, also make other improvements. $30,000 or more.

Pa., Greenville—PLANT—Greenville Steel Car Co., plans rebuilding portion of plant, destroyed by fire. $100,000 or more. Architect not appointed.

Pa., New Kensington—RETAIL STORE—Montgomery Ward & Co., West Chicago Ave. and Larr St., Chicago, Ill., plans new 2 story, retail store, 5th Ave. Est. $65,000.

Pa., Rockwood—POWER PLANT—Associated Gas & Electric Co., 61 Bway., New York, and Rockwood, plans rebuilding power plant destroyed by fire. $250,000. Private plans.

Tex., Harlingen—CITRUS PLANT—Valley Canners & Sales Co., Harlingen, c/o P. Bryant, plans purchase and installment of equipment and machinery for 12 or 13 citrus canning plants in the valley, to extract citrus juices and otherwise provide fruits for foreign shipment. Address owner direct.

Utah, Park City—MINE STRUCTURES—Park City Development Co., A. J. Hurley, pres., plans blacksmith shop, machine shop, ore bins, gallows frames, hoist house, boiler, compressor house. $50,000.

Utah, Provo—WAREHOUSE—Utah Wholesale Grocery Co., 590 South 4th St., West Provo, plans rebuilding warehouse, destroyed by fire. $125,000. M. O. Packard, Springville, pres.

Vt., Burlington—LUMBER MILL, etc.—Shepard & Morse Lumber Co., 14 College St., plans rebuilding lumber mill, sheds and office. To exceed $28,500. Architect not appointed.

Vt., Northfield Falls—PLANT—Northfield Woolen Mills, E. Karr, plans repairing lighting and fire damage to plant. Est. about $100,000. **Maturity indefinite.** Architect not appointed.

B. C., Vancouver—PLANT—Western Red Cedar Mills, Ltd., foot of Kerr St., plans plant. To exceed $75,000. Architect not appointed.

Ont., Fort Erie—PLANT—Canadian Gasket Co. Ltd., E. B. Reymolds, mgr., plans establishing plant for manufacture of gaskets, washers, valves, fittings, etc. $50,000.

N. S., Windsor—POWER DEVELOPMENT—Nova Scotia Power Comn. preparing plans for harnessing St. Croix River, near here. $300,000.

Ont., Foleyet—MILL—Pineland Timber Co. Ltd., Subury, B. F. Erwin, pres., plans rebuilding mill destroyed by fire. Est. $125,000. Private plans.

Ont., Hamilton — PLANT — Canadian Curtis Refrigeration Co. Ltd. plans plant. $40,000.

Ont., Toronto—MILL—J. C. Carroll, field mgr. Norcliff Tiblemont Syndicate Ltd., plans early purchase and installation of mill.

Ont., Windsor—PLANT—Industrial Screens & Machines Ltd., plans by G. T. Masson, archt., plant. $40,000.

Que., Actonvale—PLANT IMPROVEMENTS—Silk Industries of Canada Ltd., plans addition to plant and install additional equipment.

Que., Longeuil—GAS PLANT—City Gas & Electric Corp. Ltd., 266 St. James St. W., Montreal, plans gas plant. Private plans.

Que., Rock Island—PLANT ENLARGEMENT—Spencer Corset Co. Ltd. plans enlarging plant.

BIDS ASKED

Calif., Elk Grove—WINERY—See "Contracts Awarded."

Md., Curtis Bay—PLANT—U. S. Industrial Alcohol Co., Curtis Bay, taking bids removing present sidewall construction of 10 various buildings and replacing same with 8 in. t.c. tile, total wall area about 185,000 sq.ft., Curtis Bay. $150,000. Private plans.

British Columbia—GOLD MINING DEVELOPMENT—See "Contracts Awarded."

CONTRACTS AWARDED

Calif., Acampo—WINERY—De Flores & Cellini, Elk Grove, rein.-con., brick winery, to E. Elliott, Acampo, approximately $65,000. Awarded July 5.

Calif., Elk Grove—WINERY—Elk Grove Vineyard Assn., represented by I. Kubel, secy., 75x100 ft., concrete addition to winery, day labor.

Ind., Wabash—FACTORY—American Rock Wool Corp., steel factory, power plant and shopping buildings, on 25 acre site, to Hetherington & Berner, 701 Key Ave., Indianapolis. Est. $65,000. Noted July 19.

Mass., Revere—BULK PLANT—Tidewater Oil Co., Bayonne, N. J., 1 story, 16x73 ft. pump house, 3 story, 34x91 ft. office, 2 story, 49x119 ft. warehouse, 1 story, 65x184 ft. garage, 1 story, 33x65 ft. boiler room, concrete brick, steel construction, to Leslie R. Porter Co., 156 Stuart St., Boston. Refer to Owners for amounts. Awarded July 16. Noted July 12.

Miss., Greenville—FACTORY—U. S. Gypsum Co., 300 West Adams St., Chicago, Ill., general contract 1 story, 146x234 ft. corrugated metal siding, insulated board factory addition, plain found., to H. K. Ferguson, Hanna Bldg., Cleveland, O. Est. $600,000 or more. A 72-ft. 5-ton bridge crane, to Northern Eng. Co., 210 Chene St., Detroit, Mich. Bids July 9, awarded July 12. Noted July 12.

N. Y., Boonville—DAIRY PLANT—Sheffield Farms, Boonville and 524 West 57th St., New York, altering dairy plant, separate contracts awarded. $50,000 with equipment.

N. Y., Plattsburg—FACTORY—James Leck Co., Plattsburg, structural steel for factory and warehouse, to American Bridge Co., 71 Bway., New York, for Berst, Foster & Dixfield Co. Noted July 19, under "Contracts Awarded."

N. Y., Poughkeepsie—FACTORY—Fargo Mfg. Co., 39 Corliss Ave., 1 story, basement, 50x160 ft., steel factory, plain found., Main St., to L. H. Swenson Co., 2 Cannon St., Poughkeepsie, $35,000. Awarded about July 10.

N. Y., Rome—FACTORY—Revere Brass & Copper Co., J. P. Black, engr. in charge, 1 story, basement, 90x120 ft., and 120x387 ft., brick, steel factory, plain found., to Zingerline Bros., Front St., Rome, about $105,000. Awarded July 10.

O., Cleveland — FACTORY — Winton Engine Corp., G. W. Codington, pres., 2160 West 100th St., 1 story, 30x180 ft., brick, steel, concrete addition, to N. J. Burnham, 1453 Alameda Ave. Est. $40,000. Private plans. Awarded July 12.

Wash., Seattle—BOTTLING PLANT—Henrich Brewing Co., 5225 East Marginal Way, 2 story, 75x150 ft., bottling plant structure, to Henrickson-Alstrom Constr. Co., Textile Tower. Est. $100,000. Company will also build $50,000 addition to ageing cellar early in fall.

Wis., Wausau—PLANT—Minnesota Mining & Mfg. Co., L. A. Hatch, mgr., 1015 South 2nd Ave., general contract, brick, steel crushing and screening plant, plain found., to W. Murphy & Son, Pioneer Bldg., St. Paul, Minn., Toltz, King & Day, 1212 Builders Exch. Bldg., St. Paul, Minn., engrs.

British Columbia—GOLD MINING DEVELOPMENT—Monte Christo Bridge River Gold Syndicate, c/o W. Silcock, 1310 Walnut St., Vancouver, gold mining development, various locations, day labor. To exceed $40,000.

†Federal Government.

For official proposal advertising see Searchlight Section

Constr. News page 39

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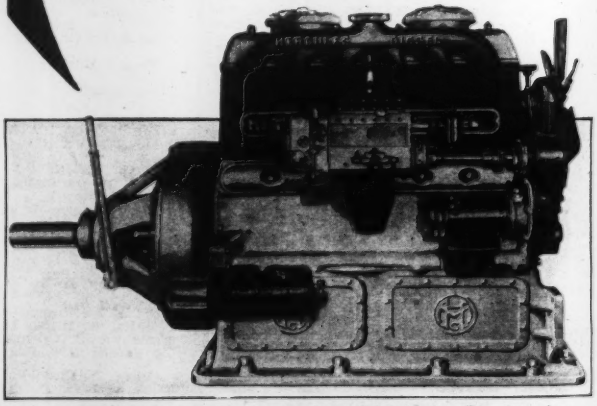

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